Insure VICTORY ... Buy Bonds for War ... Push Plans for Peace

Contractors and Engineers Monthly

Vol. 41, No. 1 JANUARY, 1944 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

Access Road Work

The provision of safe and uncongested access to military establishments and war plants has been one of the construction industry's largest contributions to the war effort. Among those described in this issue are the new 140-mile Overseas Highway to Key West, Florida; the construction of a rigid-frame overpass and a large arched concrete culvert on an industrial access road in Ohio; and Allegheny County's Duquesne Way project to improve traffic facilities in Pittsburgh. See pages 1, 2 and 23.

Post-War Planning

With the peak of the war construction program passed, the construction industry is looking forward to the plans and preparations for the post-war period. Various phases of post-war planning discussed in this issue include needed airports for the future, Thomas H. MacDonald's outline of future highway needs, a plea by Major General Fleming for immediate post-war planning, a report by the state highway departments on needed highway reconstruction, New York City's program of post-war public-works construction, and suggestions for expediting post-war planning now.
See pages 2, 11, 27, 41, 59 and 67.

Work for the Armed Forces

Assembly-line methods for the fabrication and erection of the timber-arch trusses for the 1,000 x 297-foot hangars at a Lighter-Than-Air Base of the U. S. Navy; stabilization of sand with silt for the base course and the road-mixing of the surface of a new Flight Strip recently turned over to the Army; and the improvement of a municipal airport, including a new drainage system and extensions of the runways, to convert it to Army use, are described in this issue.
See pages 7, 15 and 33.

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Florida Reconstructs The Key West Highway

By Combination of Methods Improved Overseas Highway Is Completed; Effective Use Made of Abandoned Railroad

(*Photo on page* 80)

✦ THOSE who have traveled the 7 miles of narrow wooden bridges and 99 miles of rough and winding county roads which, with 34 miles of modern highway and bridges, have constituted the 140 miles of America's most unusual highway, will be delighted to learn that their next trip to Key West, Fla., the country's southernmost city and the Gibraltar of America, can be made over a modern well-surfaced and properly aligned highway having adequately designed and well-constructed concrete bridges. The Florida State Road Department has completed during 1942 and 1943 a tremendous construction project, beset with difficulties and hindered by all the impediments to wartime construction. The newly completed road shortens the distance between Florida City and Key West by 17 miles.

When the Florida East Coast Railroad decided to abandon its line to Key West rather than repair the extensive damage done by the disastrous hurricane of 1935, a great mileage of undamaged roadbed, minus the rails but including many bridges, was left intact. It was realized that this roadbed could be utilized advantageously in the construction of an improved highway. Before 1939 the Overseas Road and Toll Bridge District, under the direction of B. M. Duncan, Engineer and Manager, had completed the widening and paving of many miles of the abandoned bridges as well as the surfacing of a considerable mileage of the road. However, there still remained over a hundred miles of rough and winding county road with wooden bridges having an inadequate load limit.

With our entrance into the war, Key West became an important part of the national defense system and its connection to the mainland by an adequate highway became a military necessity. Plans were rushed to completion and an attempt was made to let contracts for the construction of all portions of the highway which had not been previously improved. Due to the fact that portions of the work were of a rather hazardous

(*Concluded on page* 12)

C. & E. M. Photo

The beginning of an ocean-front quarry for the Key West Highway. An Ingersoll-Rand wagon drill at work while adjacent holes are being loaded with 40 per cent Hercules dynamite.

Road Dept. Handles Big Grading-Surfacing Job With State Organization And Local Material

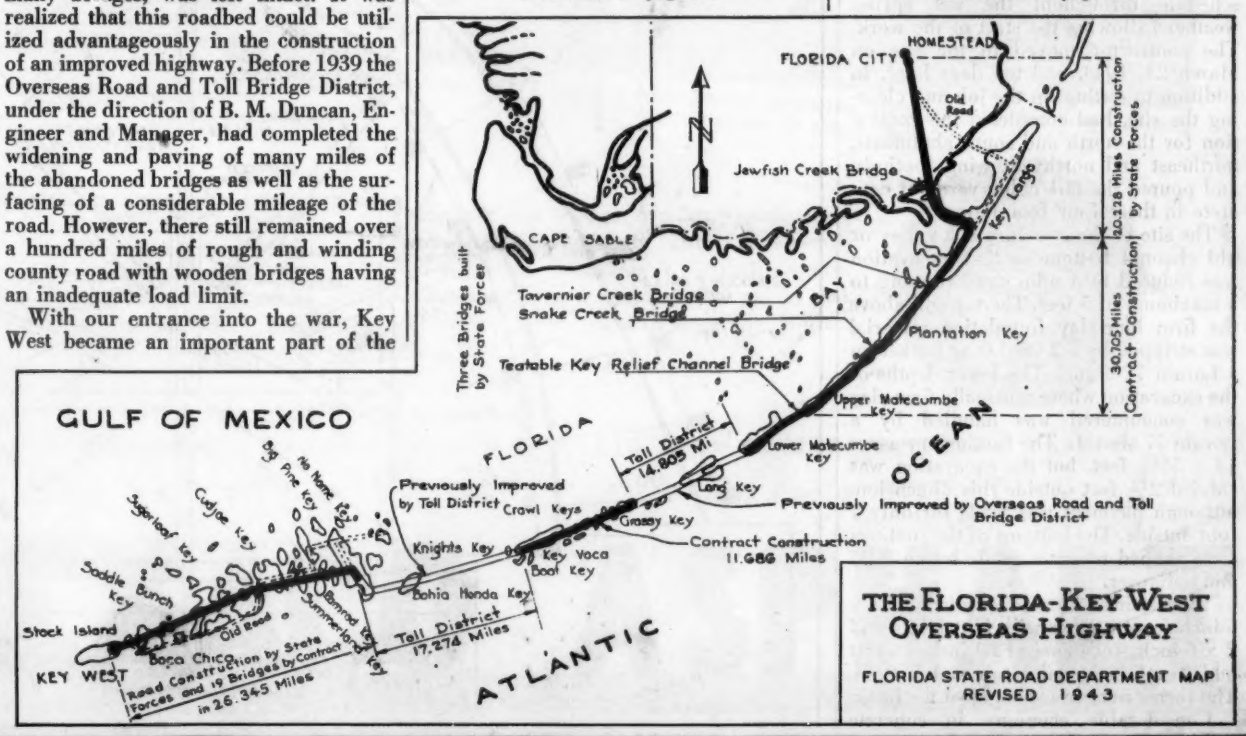
✦ BECAUSE of the war-engendered scarcity of contractors willing to undertake large and hazardous operations at pre-war prices, the Florida State Road Department found it necessary, in 1942, to start with its own forces the construction of 84.5 miles of the 140-mile Homestead-Key West Overseas Highway.

After the attempt to contract for the construction of this important link in the strategic-highway network had resulted in the successful award of contracts for only a portion of the work, it was deemed advisable to continue the remainder by using state forces and state-owned and rented equipment. E. C. DeGarmo, Assistant State Highway Engineer, had been selected to organize and manage this undertaking. He established headquarters for the work at Homestead, near the northern terminus, collected a corps of able assistants, and commenced operations.

Grading Operations

The entire route of the improvement, with the exception of approximately half a mile at the northern end which serves

(*Continued on page* 30)



Form Work Features Two Ohio Structures

Large Grade-Separation Structure Built by The Horvitz Co., Using Panel Forms for Large Pours

(*Photo on page 80*)

✦ DESPITE the continued cold and wet weather of last spring throughout the northeastern section of the country, the contract for a much-needed grade-separation structure being built on an industrial access road near Cleveland, Ohio, by the Department of Highways, was carried forward with minimum delay. Working in mud that ran from sticky to greasy, depending on the amount of rain at the moment, equipment and materials were brought in and the work pushed diligently. The reinforced-concrete rigid-frame bridge has a clear span of 76 feet with skew and carries a 56-foot roadway, divided by a 4-foot mall of black concrete, and two 3-foot sidewalks.

The roadway has a crown of 3/16 inch per foot of roadway width, and the overpass is on an 0.48 per cent grade, so that water will flow to the curbs and toward one end of the structure. The wearing surface of the roadway is concrete.

The sidewalks are protected by a 9-inch concrete curb on the inside and by concrete posts on the outside. Instead of the usual pipe rails used on structures of this type in Ohio, wood rails are used, carried on wood risers from the posts. The posts are spaced 6 feet 5⅜ inches on the south wing wall, 6 feet 10¼ inches on the north wing wall, and 7 feet 10¾ inches on the bridge. The concrete posts are 1 foot 6 inches high with a riser 1 foot 4 inches high of 4 x 4-inch wood posts with a 3 x 6-inch top rail. The 4 x 4-inch posts rest in a pipe sleeve in the concrete posts so that they may be removed easily after the war and pipe risers welded on.

To provide for possible settlement of the approach fills, the contract followed Ohio standard practice of requiring two 15 x 56-foot reinforced-concrete approach slabs 10 inches thick.

Excavation and Footings

The contractor's early speed in getting the job under way contributed materially to the maintenance of a fast construction schedule throughout the wet spring weather following the start of the work. The contractor moved to the site on March 24, 1943, and ten days later, in addition to setting up the job and clearing the site, had completed the excavation for the north and south abutments, northeast and northwest wing footings, and poured the 661 cubic yards of concrete in these four foundations.

The site of the structure is a valley or old channel bottom so that excavation was reduced to a minimum, running to a maximum of 5 feet. The top soil above the firm blue-clay foundation material was stripped by a 2-yard drag bucket on a Lorain 77 crane. The lower depths of the excavation where unusually firm clay was encountered was handled by a Lorain 77 shovel. The footings measure 14 x 56½ feet, but the excavation was carried 2½ feet outside this dimension, although payment was made for only 1 foot outside. The bottoms of the footings were shaped to exact grade by an RD7 and bulldozer.

The footings forms were made of 1 x 6-inch form lumber with butt joints and 2 x 6-inch studs spaced 20 inches apart and 4 x 6-inch wales top and bottom. The forms were braced against the bank.

Considerable economy in concrete

C. & E. M. Photo
The north abutment forms for the rigid-frame bridge on a wartime access-road project near Cleveland, Ohio.

was effected by the careful design of the footing, which is 2 feet 6 inches high at the back and 3 feet thick at the front, rising to 4 feet 6 inches thick where the load from the abutment bears on the heavily reinforced block of concrete. The abutment bearing on the footing is a 2-foot 6-inch radius arc with 1/16-inch asbestos-rubber packing between the footing and the abutment.

Full advantage of these poured foundations was taken in the unusually bad construction weather which followed this phase of the work during the month of April.

Abutment and Wing Walls

The abutments of the rigid-frame structure are 3 feet thick at the footing, increasing to 5 feet 1 inch at the top, 24 feet above the footing. They are reinforced with 1¼-inch square deformed bars carried from the abutments into the arch slab. The arch itself is 5 feet 1 inch thick at the abutment, and 2 feet 9 inches thick at the center. The decorative pylons are an integral part of the wing walls, but are not built to add strength to the structure.

(*Continued on page 44*)

Arched Culvert Built With Unit Form and Centering Used Five Times for the Barrel 212 Feet Long

✦ THE design and construction of a large plain-concrete arched culvert on an Ohio industrial access-road contract make an interesting commentary on economy in man-power and materials. First credit goes to the carefully considered design by the engineers of the Ohio Department of Highways, and second to The Horvitz Co., contractor for the job, who developed a unit collapsible wood form for the 18-foot span culvert, permitting rapid shifting and consequent speed of completion.

Design of Culvert

Designed to conserve critical material, the large arched culvert on access road Project DA-WI-10A(1) in Cuyahoga County, Ohio, is of plain concrete, necessitating greater bulk, but providing an economical structure. The culvert is 212 feet long with an 18-foot span and a rise of 15 feet from the top of the invert to the intrados. The invert is 14 feet wide with a 3-inch dip toward the center and is 12 inches thick at the sides, reducing to 9 inches at the center. The invert is dropped 3 inches below the top of the inside bevel of the footing on either side.

The footings are each 9 feet 6 inches wide, 4 feet 3 inches maximum thickness, and have an outside bevel extending 5 feet 6 inches along the base from the outside and 2 feet 3 inches high at the outside. The irregular shape of the footings increases the bearing area and also conserved concrete without loss of strength.

The arch is 3 feet 6¼ inches thick at the haunch and 1 foot 4½ inches thick at the crown, which was poured as a key after the two haunches had been poured.

The Collapsible Forms

The contractor at first decided to build a continuous form for the 212-foot culvert, but some careful figuring on the

(*Continued on page 16*)

C. & E. M. Photo
As the first section of the culvert was being poured, the form protruded from the sloping cut-off end of the structure.

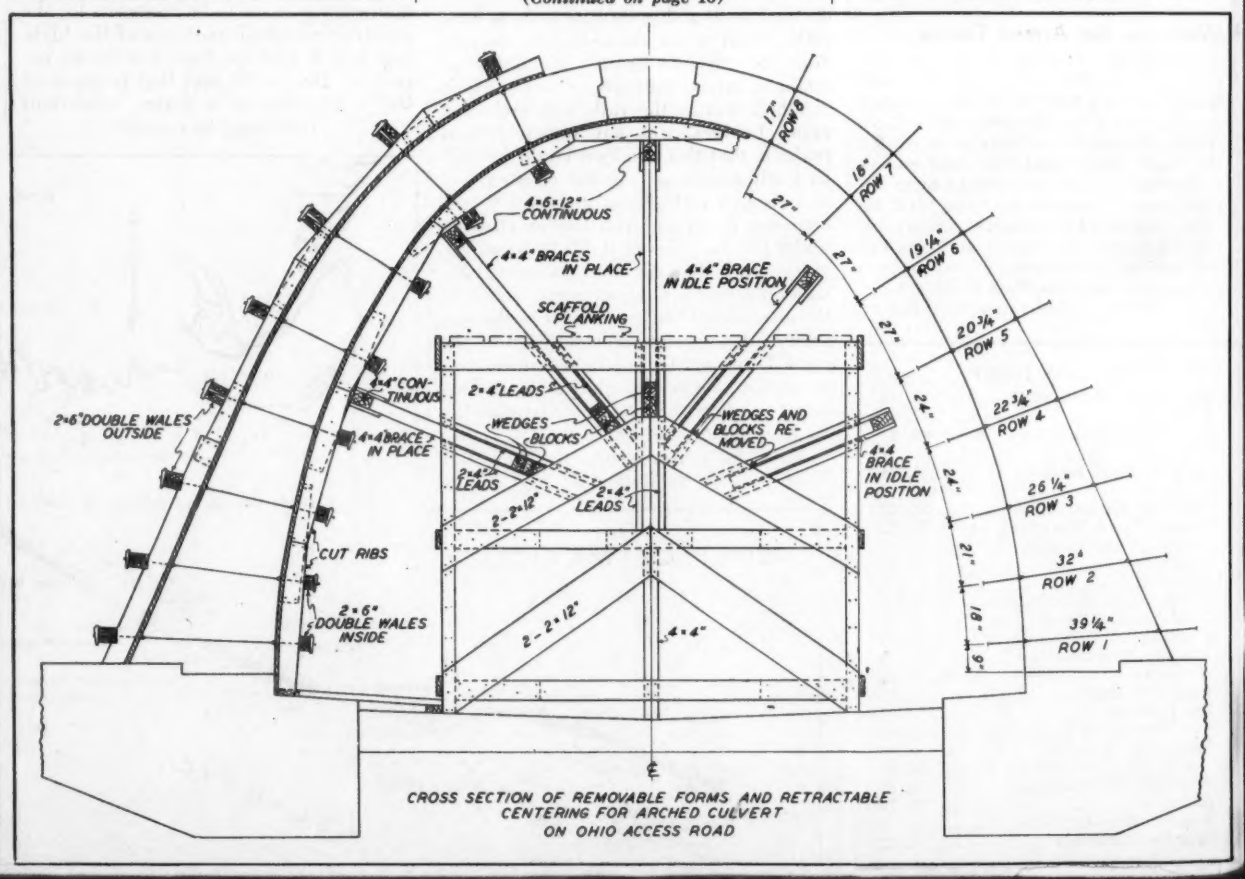
Need 6,000 Airports For Post-War Travel

Charles I. Stanton, Head of Civil Aeronautics, Calls for Doubling of Present 3,000 in Early Post-War Years

✦ IN the opinion of Charles I. Stanton, Administrator of Civil Aeronautics, the doubling of the present national total of almost 3,000 airports in the first decade after the war is a necessity. It is reasonable to presume that communities of a thousand or more people will desire access by airplanes. In the United States there are 6,669 communities with a population of 1,000 or more. Disregarding those which are close together and can use an airport jointly, and considering that larger cities will need several airports, a national total of 6,000 airports is a reasonable target to shoot at in the early post-war years.

The present airport system includes 1,213 Class I airports, those having landing areas from 1,800 to 2,500 feet long. There are 905 Class II airports, each with paved runways from 2,500 to 3,500 feet long. These are situated mostly near smaller cities and larger towns. It is Mr. Stanton's opinion that we shall require many more of this class for future commercial flying of the short-haul feeder-line type. Finally there are 865 airports of Class III or better, with paved runways 3,500 feet in length or longer. Although this compares with only 76 such fields two years ago, it still cannot be said that there are enough of these

(*Concluded on page 25*)

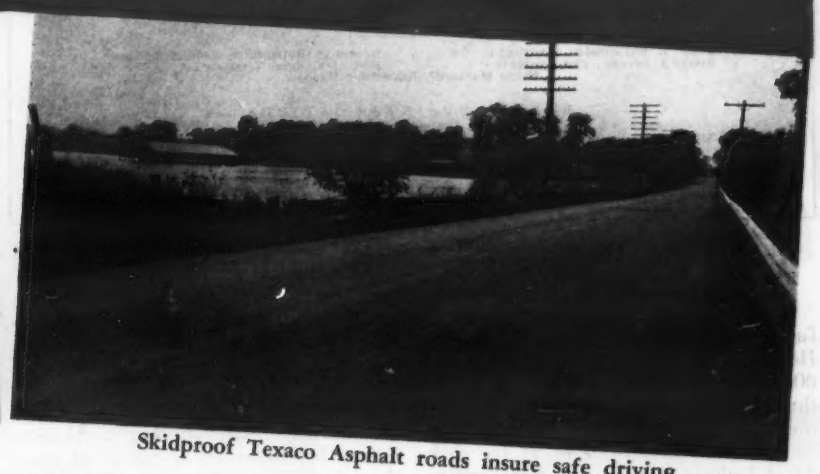


CROSS SECTION OF REMOVABLE FORMS AND RETRACTABLE CENTERING FOR ARCHED CULVERT ON OHIO ACCESS ROAD

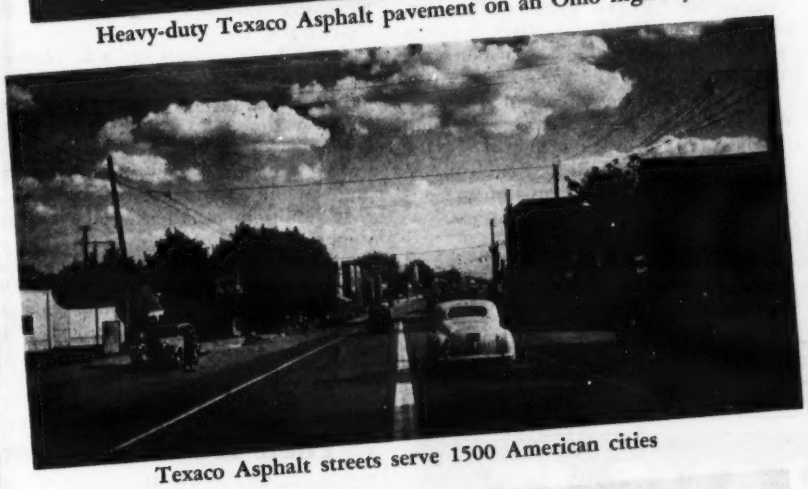
IMPORTANT ALLY OF AMERICA'S ROAD BUILDERS

for over a third-of-a-century

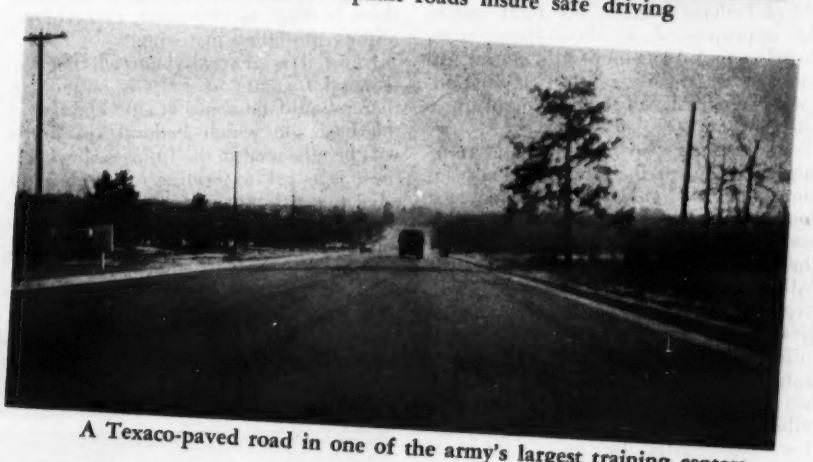
Heavy-duty Texaco Asphalt pavement on an Ohio highway



Skidproof Texaco Asphalt roads insure safe driving



Texaco Asphalt streets serve 1500 American cities



A Texaco-paved road in one of the army's largest training centers

Hundreds of miles of farm-to-market roads are Texaco-surfaced

A low-cost treatment with Texaco Surfacing Material gave this South Dakota highway a tough mat

Going back almost to the beginning of the century, American road builders have found a versatile ally in Texaco Asphalt products. For heavy-duty pavements, low-cost surfaces for secondary roads, surface-treatments, dust-laying and maintenance, road builders have learned from long years of experience that Texaco Asphalt products meet every highway need fully and economically. Texaco Engineers, specialists in Asphalt construction, will be glad to cooperate with you in making plans for your post-war street or highway program.

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Let's Simplify Federal-Aid Allocation

Right now there is considerable confusion in state highway circles over House Bill 2426 authorizing $1,000,000,000 in Federal funds in each of the first three post-war years to be expended on the state highway systems when matched by the states at the rate of $1 for each $3 of Federal money. The total sum to be appropriated in these three years nearly equals the sum of all Federal Aid since it was instituted in 1916 and increases Federal Aid to about eight times the pre-war rate.

Brady Gentry, in his address as retiring President of the American Association of State Highway Officials, devoted most of his discussion to this bill which was originally framed by a committee of the Association. In its original form, the bill, which was filed in March, 1943, provided for apportionment based equally on population, areas, and post-road mileages. Following a protest by several industrial states, a new apportionment has been suggested which would distribute the money one-half by population, one-quarter by area, and one-quarter by post-road mileage. As a further endeavor to secure the approval of the industrial states, another change has been offered by its sponsors, to appropriate an additional $250,000,000 per year to be allocated according to the urban populations of the various states.

Any new formula for allocation should be based primarily on the highway needs of the several states and should not be predicated on any other factors, either permanent or transitory. The fundamental conception of Federal Aid for highways in the twenty-eight years it has been a policy of this nation has been to aid in the establishment of an adequate connected primary highway system within and between states. The mileages of the Federal-Aid system of course vary from state to state, according to its area and its needs. Thus, any temporary condition or emergency, such as unemployment, which would be greater in industrial states than in rural, should not be a consideration in any discussion of the new Federal-Aid allocation. Tacking on another appropriation of $250,000,000 annually as a sop to the industrial states, which would have a much greater urban population, is similarly out of order, as it is not a part of a basic overall formula which is properly correlated with highway needs.

In addition, the change in the ratio of Federal and state funds to a 3 to 1 basis is not wholesome. At the source of the dominant finances, one usually finds the dominant control. Even with the matching of funds on a 50-50 basis, we have heard in many states, both rural and industrial, the complaint of too much Federal control. Further, the change from equal shares to 3 to 1 matching means that for the $1,000,000,000 made available by the Federal government, the states would provide $333,333,333, making a total of $1,333,333,333 available for needed highway construction. If the 50-50 formula is retained, this sum would be $2,000,000,000, or $666,666,667 more, for better highways. As more money for highways is our great need, there is much to be said in favor of retaining the 50-50 matching.

Since it is generally agreed that the original formula of 1916 is outmoded, there should be some drastic change in the basis on which Federal-Aid funds will be allocated in the future. However, there is as yet no meeting of minds as to what these changes should be.

To us, the highway needs of the various states seem to constitute the most logical basis for distribution or allocation of Federal funds. The AASHO published in the October issue of *American Highways* a table of the highway needs of each state, based on the decisions of the highway officials of each state. Since we have such a statement of needs before us, why not use it, subject to review by the Public Roads Administration, as the basis of allocation for new Federal-Aid funds? It is highways we need, so highway needs should furnish the simplest, most direct ratios for allocation.

A.R.B.A. Convention In Chicago Feb. 1-3

Three major problems of deep concern to the highway industry will be discussed at the Forty-First Annual Convention of the American Road Builders' Association to be held at the Edgewater Beach Hotel, Chicago, on February 1, 2 and 3, 1944.

A highlight of the conference program will be an address by Paul G. Hoffman, President of the Studebaker Corp. and Chairman of the Committee for Economic Development, who will present suggestions to the highway industry for meeting post-war problems. Other speakers will include R. G. LeTourneau, President of R. G. LeTourneau, Inc.; Colonel William N. Carey, Chief Engineer, Federal Works Agency; Samuel C. Hadden, Chairman of the Indiana State Highway Commission; Hon. Carter Manasco, Chairman of the House Sub-Committee on the distribution of war surpluses; Hon. Jesse P. Wolcott, member of the House Roads Committee and the Banking and Currency Committee; Hon. J. W. Robinson, Chairman, House Roads Committee; and H. E. Hilts, Deputy Commissioner, Public Roads Administration.

"Never in history have the members of the Association been confronted with such a formidable array of problems," Charles M. Upham, Engineer-Director, points out. "Road and street builders must be united in their attack on each of them. A first step is finding out the facts, and that we intend to do. Authoritative speakers representing both business and Government will discuss each subject thoroughly. Panel discussions and question-and-answer periods will assist in working out solutions."

"I know when he told us to get a "cat", it wouldn't work, but I'm not dumb enough to argue with a Second Lieutenant."

The back-orders for highway and street construction and maintenance are up to needs more serious and general than most people realize, according to Mr. Upham. Means must be found to make man-power available to the highway agencies and to obtain repair parts for construction equipment.

A related problem to be considered is that of post-war highway requirements. A backlog of highway needs is increasing so rapidly that urgency of the Post-war Highway Plan of the A.R.B.A. is becoming more and more apparent, Mr. Upham states.

A third major problem will be taken up in a panel discussion of the distribution of surplus war construction equipment by the Army and Navy. Representatives of the U. S. Treasury, War Production Board, of Congress, and the highway industry will participate.

In addition, meetings of the Postwar Councillors and of the nine divisions of the A.R.B.A. will be held, as well as various committee meetings. The Old Timers Reunion is scheduled for February 1 and the annual banquet will be held February 3.

The Moles Announce Their Award Winners

Lieutenant-General Brehon B. Somervell, Chief of the Army Service Forces, will receive one of the two awards made annually by The Moles to a non-member and a member for "outstanding contributions to construction progress". Arthur A. Johnson, New York contractor and Vice President of The Moles, an organization of tunnel and heavy-construction men, will receive the member award.

Selected for the award in recognition of his brilliant administration of the A.S.F., General Somervell has had under his direction a larger program of construction and production than any man in history within a similar period. Before his appointment in 1942 as commanding general of the Services of Supply which became the A.S.F., General Somervell had for two years directed the Construction Division of the Quartermaster Corps. His career began with the Corps of Engineers, upon his graduation from West Point in 1914.

The other award recipient, Arthur A. Johnson, is President of the Arthur A. Johnson Corp., and Chairman of the Post-War Public Works Committee of the General Contractors Association of New York. For more than 35 years, Mr. Johnson has been engaged in building subways, tunnels, and other engineering projects in and around New York City. His recently completed war contracts include the Letterkenny Arsenal in Pennsylvania, a $9,000,000 project which was finished in 200 days, and he was one of three contractors on the $30,000,000 Bermuda Army Air Base. He has twice been elected President of the General Contractors Association of New York.

Presentation of the Awards will be made at a dinner on February 2, which more than 600 leading construction men and engineers are expected to attend.

Compensating

FINE and COARSE

In Pit-run GRAVEL

FIRST STEP

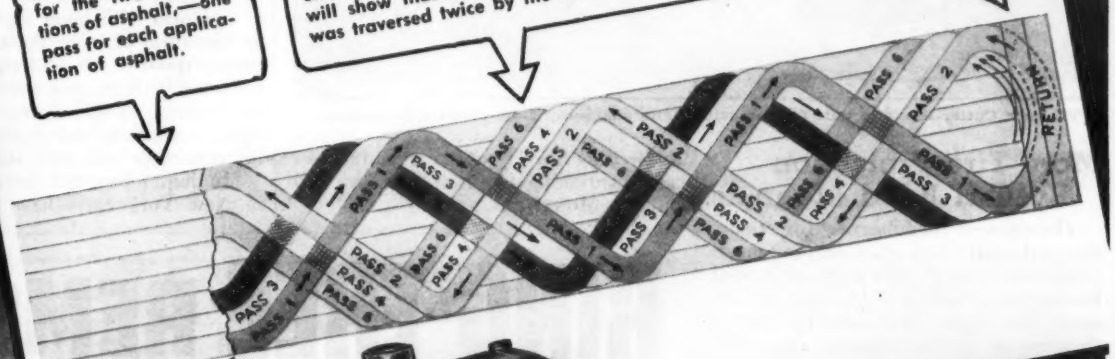
Mixing in longitudinal strips for the full length of the section to be stabilized. Two such passes were made over the area for the two applications of asphalt,—one pass for each application of asphalt.

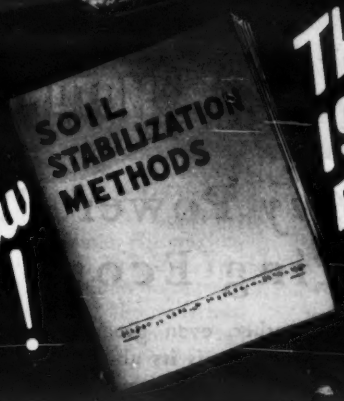
SECOND STEP

Mixing by operating the SEAMAN MIXER in a series of adjacent figure 8's. One operation (one figure 8) covers the field twice; — two directions. This blends fine and coarse strips of bank run material as well as blending rich and lean strips. The diagram below shows only six figure 8's, three trips out and three returning, — but this pattern was continued until entire area had been so treated. Study will show that in this way every square foot was traversed twice by the SEAMAN.

THIRD STEP

Corners at end of runway shoulder were mixed in transverse strips at right angles to the runway.





New! The 1944 Edition

If you would like to have a copy of the 1944 edition of "Soil Stabilization Methods", which covers the most recent developments in soil stabilization, write for Bulletin E-24.

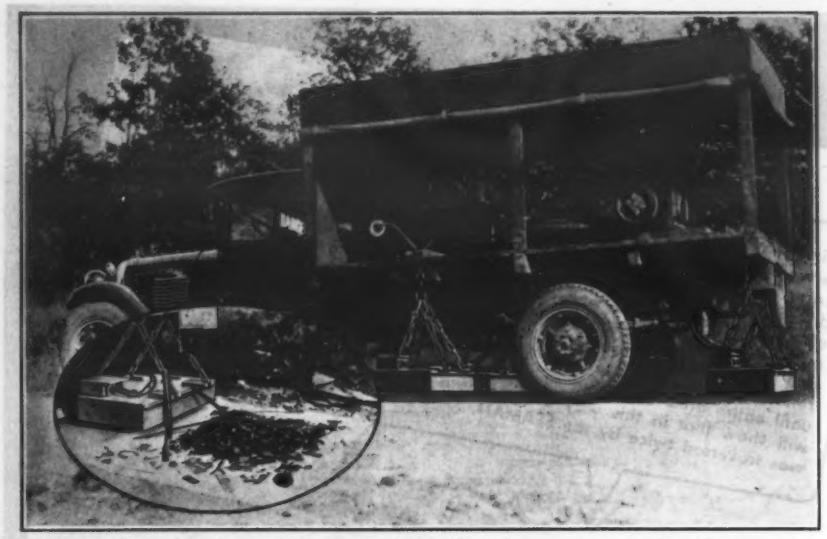
At an eastern military air field, specifications called for 75-foot bituminous stabilized shoulders on each side of the runways.

These shoulders consisted of pit-run gravel laid on primed sub-grade, and then mixed in-place with Seaman Pulvi-Mixers using MC-3 as binder. The gradation of the pit-run gravel varied, however, from sand to coarse material — a factor which would constantly change the oil requirement. To solve this, the SEAMAN MIXERS were operated in a series of Figure 8's or zig-zag courses of continuous cross-mixing. This blended lean strips of fines with the heavy black strips of coarse gravel as well as correcting gradation.

Moreover, — because of the leveling action of the SEAMAN MIXERS — longitudinal and lateral correction to grade became almost automatic during the in-place mixing operation. In spite of extra travel needed to correct the variation in the aggregate, — two SEAMAN MIXERS averaged approximately 20,000 square yards a day.

Just another tough problem made easy with the SEAMAN.

SEAMAN MOTORS



The new Cutler-Hammer unit for removing nails and scrap from roads and runways.

More Tire Protection By C-H Road Magnets

The value of road magnets for removing nails, wire and other ferrous metal from roads and airport runways is well known and a number of highway departments have made such units for use on their roads. Cutler-Hammer, Inc., 315 North 12th St., Milwaukee 1, Wis., has now developed a special magnet for this purpose. Three of them are usually used for one road cleaning unit, two being mounted directly ahead of the rear wheel and the third in the center at the rear end of the truck. When mounted in this manner, a road span of 8 to 9 feet may be covered.

For best results the magnets are carried from 2 to 3 inches above the surface of the road. The four mounting plates on each magnet permits bolting them to brackets or suspending them by chain or cable. Power for the magnet is usually supplied by a commercial engine-driven generator mounted on the truck. The controller consists of a two-pole switch with one discharge contact, the necessary discharge resistor, and a separately mounted push button.

Complete information on this Cutler-Hammer road magnet may be secured by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

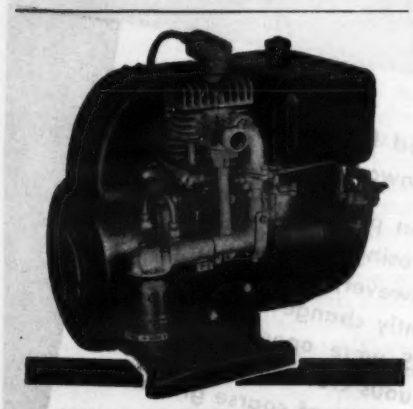
New York State Plans For Post-War Projects

An outline of procedure to be followed by municipalities and districts in New York State when applying for a state grant for planning municipal post-war projects has been prepared by the New York State Postwar Public Works Planning Commission in conjunction with the New York State Department of Public Works. This booklet is divided into four sections, covering very comprehensively the steps to be taken by a municipality in securing a state grant toward the design of a municipal project, the form for both preliminary and final plans, estimates and specifications to conform with good engineering and architectural practice, the answers to the twenty questions most frequently asked by municipalities, and a series of appendices giving sample forms for applications, resolutions and reports to be used in connection with such state aid.

Municipal post-war projects planned in New York State have increased in number and at the end of November, 1943, totaled 2,235, with an estimated construction cost of $254,848,357. These projects may be divided as follows:

	No. of Projects	Estimated Cost
Schedule A Plans complete	275	$ 23,354,056
Schedule B No state grant requested	42	1,746,400
Schedule C No plans required	115	2,749,061
Schedule D Local share assured	1,274	151,937,397
Schedule E Local share not assured	529	75,061,553

At this time, the State of New York has available for immediate use approximately $89,000,000 for the construction and reconstruction of highways, bridges and grade crossings, according to the New York State Highway Chapter of the Associated General Contractors of America, which is working closely with the State Planning Commission. Providing labor and materials were available, the State Highway Department could advertise for bids on projects amounting to $36,000,000, and this work could be awarded within thirty days. This means, of course, that all plans and specifications and acquisition of rights-of-way have been completed on the projects included in this figure.



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ONAN GASOLINE-DRIVEN ELECTRIC GENERATING PLANTS provide power and light for construction projects anywhere, for all applications where electricity is not otherwise available, and for emergency service.

They're doing war winning work on all fighting fronts.

Sizes from 350 to 35,000 watts. 50 to 800 cycles. 110 to 660 volts. A.C. 6 to 4000 volts. D.C. Also A.C.-D.C. models.

Your inquiry regarding present or post war needs will receive prompt attention.

D. W. ONAN & SONS, 1237 Royalston Ave., Minneapolis, Minn.

ONAN
ELECTRIC PLANTS

RING-FREE REMOVES CARBON
REDUCES FRICTION, SAVES FUEL!

Don't Deprive *Any* Power Plant Of This Operating Economy!

Carbon trouble is expensive in downtime and repair bills on all sizes and types of Diesel and Gasoline engines. In every engine suffering from carbon, the first crankcase full of Macmillan RING-FREE Motor Oil begins to *remove* the carbon from pistons, rings, valves *while the engine runs.* Continued use of RING-FREE keeps the formation of destructive carbon in check. The result is a cleaner, more thoroughly lubricated, sweeter running engine.

Another, even greater RING-FREE advantage is its ability to reduce friction *fast!* That actually delivers more power to the drive shaft . . . produces measurable fuel savings. It also cuts down wear and repair. Many operators who started by lubricating just one of their engines with RING-FREE were so convinced by the performance and economy obtained that they now order Macmillan RING-FREE for *all* their motorized equipment.

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REDUCES WEAR BY REDUCING FRICTION

Timber Arch Trusses For Navy LTA Hangar

Size of Structure Requires Special Erection Methods Of Prefabricated Trusses; Box-Girder Door Controls

(*Photos on page* 80)

✦ AT a Lighter-Than-Air Base constructed on the east coast by the U. S. Navy during 1943, the use of timber, given fire-retardant treatment and shipped to the job already cut, bored, and match-marked, reduced costs and expedited completion of the huge hangars.

The first step in the construction of the 1,000 x 297-foot hangars was the excavation for, and the pouring of, concrete footings for the modified A-frame concrete bents on which the timber arch trusses are placed. The excavation was done by clamshell-equipped cranes and the final finishing of the excavation by hand methods.

Subfootings 6 x 10 feet were poured under each leg of each concrete bent with a foundation block 4 x 7 feet on top of the subfooting. The modified A-frame structures have one vertical post on the side next to the interior of the building, 2 feet 6 inches x 1 foot 8 inches in cross section and 24 feet high, and one back post of the same cross-sectional area inclined toward the vertical post at the rate of ⅓ foot per foot of vertical height. These two members are 31 feet apart at their junction with the footing and 21 feet 6 inches apart at their tops, which are connected with a horizontal concrete beam of similar cross-sectional dimensions and 21 feet 6 inches long. These modified A-frames were constructed directly opposite each other, approximately 250 feet apart and at 20-foot centers laterally.

After the erection of the wooden trusses had been completed, the entire covered area was paved with a concrete floor 5 inches thick and roughly 300 feet wide and 1,000 feet long. This floor was separated into sections 10 x 20 feet in area by premolded expansion joints placed on 120-foot centers.

Wood Arch Trusses

The wood arch trusses with a clear span of 237 feet and a rise of 133 feet rest on the concrete A-frame structure. They are 19 feet deep at the haunch and 13 feet deep at the crown, built of Douglas fir from the west coast. The individual members vary in size from 4 x 8 inches to 6 x 18 inches, with a large number of 3 x 12 and 3 x 14-inch pieces.

All trusses were cut, bored, grooved for the Teco connectors, and match-marked by the Henry Mill & Timber Co. at Tacoma, Wash., loaded as single flat pieces and shipped to either Wilmington, Calif.; Gainesville, Fla.; Franklin, Va.; or Fordyce, Ark.; where they were treated with fire-retardant by the American Lumber & Treating Co. and then routed to the contractors' assembling yard.

Since the fifty-one trusses which comprise the upper portion of each hangar are identical, the storing, handling and bolting into finished truss sections were handled as a well-organized production-line problem. The trusses were assembled into four sections at the yard, two to reach from the concrete-foundation frames and the approximate quarter-point of the truss and the other two reaching from the quarter-point to their juncture at the crown.

Each truss, in four sections, was moved from the fabricating yard to a point convenient to its final location by means of a carriage erected on a railroad flat car. From there the individual sections were handled by two stiffleg derricks, erected on 120-foot steel towers which rolled on railroad rails previously laid through the long dimension of the hangars. The two lower haunch sections were first placed, bolted and guyed, and braced to the last previously completed truss. When the lower sections were securely in place, the two upper sections necessary to complete the truss were placed by the same tower-mounted der-

(*Concluded on page* 21)

Official U. S. Navy Photo

The truss fabrication yard.

Bakers Clear Right-Of-Way for Pipe Line on Rim of Arctic!

Asphalt to extend and maintain the Alaska Highway, high octane gas for Japan-bound bombers and post-war cargo planes and diesel fuel for power in far north mines, canneries, pulp mills and fisheries will be made available by completion of the 600 mile long Canol pipe line in northern Canada.

This line will bring oil from wells at Fort Norman, Northwest Territory — trading post on the Mackenzie River — to a refinery under construction near Whitehorse, Yukon Territory.

Baker bulldozers are being used to doze trees, brush and rocks, fill gullies, level and grade, and to otherwise clear a right-of-way for the pipe line. This project was made necessary by the war and will pay off after the war, too. It will be unnecessary to haul petroleum products from the United States.

Baker hydraulic bulldozers with their direct lift and full down pressure on the blade are proving ideal for work in the frozen forest and wastelands. The full weight of the tractor front end can be brought to bear on the blade—tough, frozen sub-arctic soils find their master in the Baker.

Send for Catalog 839.

THE BAKER MFG. CO.
585 Stanford Ave., Springfield, Ill.

Section of right-of-way clear... Bulldozers.

Baker overhead tie rod protects cab and operator against falling timber.

ARMY E NAVY

BAKER

The Modern Tractor Equipment Line for
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
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COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
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Wartime Resurfacing Of Indiana Highways

Old Age Creeping Up On Roads Carrying Vital War Traffic Made Statewide Projects Necessary

✦ HIGHWAY construction financed by the state gasoline tax began in 1923 in Indiana. This means that now each year a certain part of the pavements on the state highway system reach a condition requiring reconstruction. This has been hastened near military and manufacturing centers due to heavy haulage of munitions and matériel. At the beginning of 1943, Indiana faced a critical situation in highway reconstruction and intensified maintenance. Curtailment of new construction by WPB left maintenance as the only alternative.

The Condition Survey

In order to determine the exact condition of all highways and the proportion that were in greatest need of resurfacing, the State Highway Commission instructed the District Engineers to make a pavement-condition report on the basis of winter damage, indicating whether or not the pavement would go through another winter without resurfacing to protect the existing investment and prevent its loss as well as the total loss of service of the pavement for handling traffic. The District Engineers reported 508.5 miles of state highway requiring immediate resurfacing, with widening to 22 feet in instances where the heavier traffic could not operate safely on the old 18-foot pavements.

The district reports were reviewed in the field by the Superintendent of Maintenance and the Chief Engineer of Construction with the District Engineers. As a result of the review, the mileage of road which was considered a positive "must" for resurfacing was cut to 229.21 miles. This was done at the instigation of Samuel C. Hadden, Chairman, State Highway Commission, on the basis of the estimated financial condition of the highway funds. Gas rationing started in December, 1942, so that it was obvious that the income available for resurfacing would be cut severely during 1943. Further, the first $12,200,000 collected from the gas tax in Indiana goes to the counties, the next $3,000,000 to the cities, and then half the cost of the operation of the state police is taken from the balance before the Highway Commission can determine the funds it will have to expend to maintain the state highway system in serviceable condition.

The program established as a result of the inspection by the state engineers was then submitted to the Public Roads Administration district office in Chicago acting for WPB. The District Engineer made an inspection resulting in the approval of 157 miles for resurfacing and widening and a failure to recommend the balance of 72.21 miles for favorable action by WPB. The state highway officials prepared a complete statement of the condition, the service rendered to military production, and the necessary work, with illustrations of the road condition, as a presentation and took the report to Washington to the Public Roads Administration and the War Production Board.

In order to convince the PRA and others in Washington that the work could actually be done, proposals were prepared and bids asked on May 18, 1943, to determine whether the contractors of the state were interested and able to carry on such a program of resurfacing. In preparing the proposals, care was taken to set up projects long enough to attract contractors because the quantities were sufficient to justify moving in their equipment and hot or cold-mix plants. The receipt of the bids showed that both plant and labor were available for the work. This went far to show the officials in Washington that the program was feasible at that time.

Following approval of the 157-mile program by PRA, it was presented to the Non-Industrial Facility Committee of the War Production Board and was approved. At that time the committee was told that the balance of the program was still in discussion with the District Engineer of the PRA at Chicago. Later he recommended an additional 13 miles, making the total program 170 miles, finally approved for work. The first contract was actually started June 15, 1943.

Type of Work

The work was divided into two classes: high-type, using bituminous-concrete hot-mix or bituminous-coated-aggregate cold-mix binder course and a bituminous-concrete or rock-asphalt wearing surface; low-type, crusher-run material used in two layers to furnish a 4½-inch compacted aggregate base with a 1-inch bituminous-coated-aggregate cold-mix wearing surface on the primed base.

The widening strip was 2 feet 3 inches on each side of the existing 18-foot bituminous or concrete pavement and 6 inches deep, with the material laid and compacted in two 3-inch layers. During 1942 the widening was done with the same material as the pavement being widened, but last year the work was all of asphalt, using the same material as the resurfacing. This was done as an economy measure without loss of quality, and also to speed construction after a delayed beginning made necessary by

(Concluded on page 64)

The NITE-HAWK Gives You:

LIGHT—Where you want it—when you want it.

POWER—To operate hand tools—saws, drills, hammers, etc.

Floodlight and Searchlight Units up to 14 million candlepower.

Write for Bulletin 161

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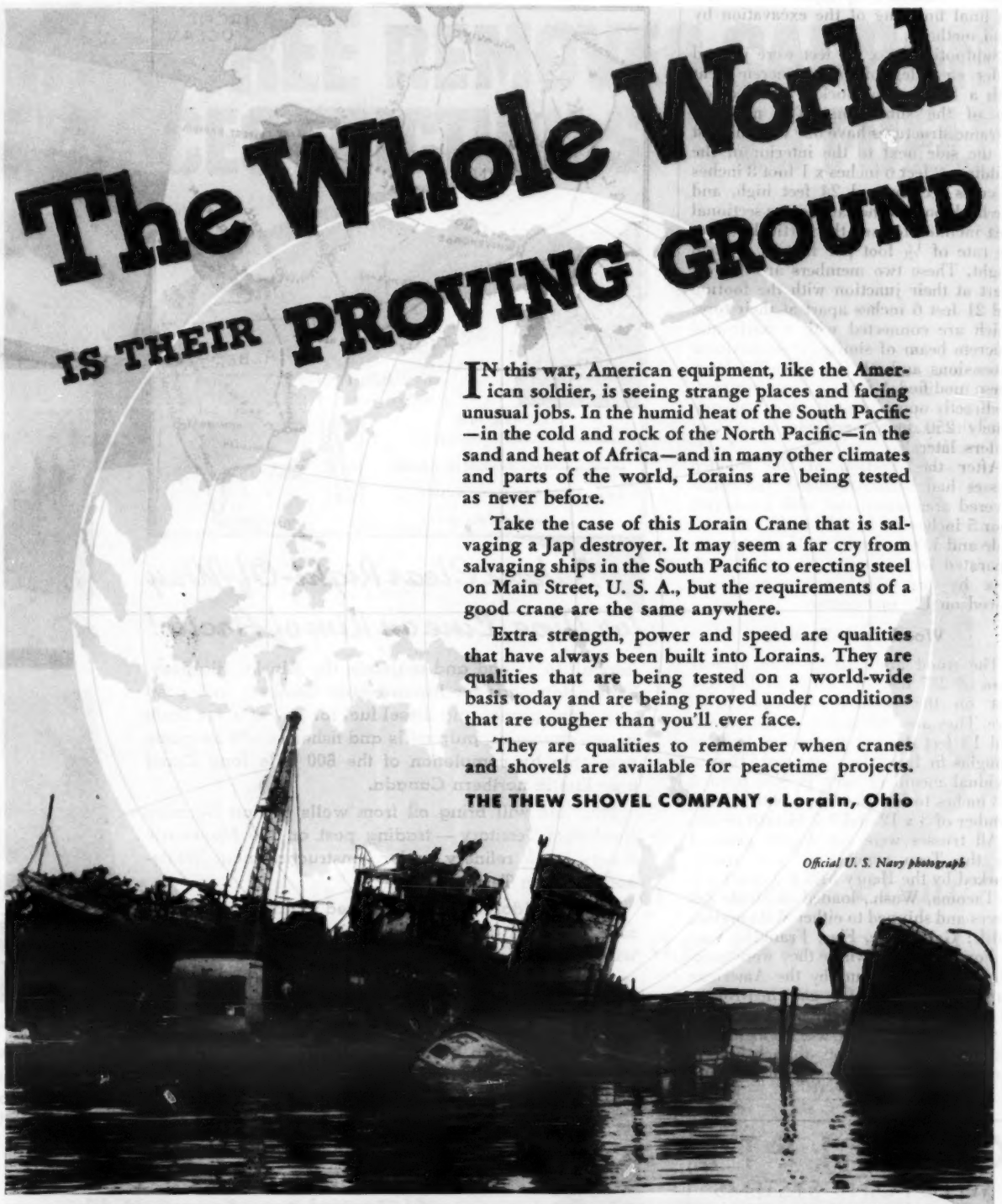
The Whole World
IS THEIR PROVING GROUND
IN this war, American equipment, like the American soldier, is seeing strange places and facing unusual jobs. In the humid heat of the South Pacific—in the cold and rock of the North Pacific—in the sand and heat of Africa—and in many other climates and parts of the world, Lorains are being tested as never before.
Take the case of this Lorain Crane that is salvaging a Jap destroyer. It may seem a far cry from salvaging ships in the South Pacific to erecting steel on Main Street, U. S. A., but the requirements of a good crane are the same anywhere.
Extra strength, power and speed are qualities that have always been built into Lorains. They are qualities that are being tested on a world-wide basis today and are being proved under conditions that are tougher than you'll ever face.
They are qualities to remember when cranes and shovels are available for peacetime projects.
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SHOVELS • DRAGLINES • MOTO-CRANES

Clearing an Airfield Of Heavy Root Growth

Novel Method Used to Remove Brush And Tree Roots from 10-Acre Site For New Airfield in the South

✦ WHEN work was started on a new Army airfield in one of the southern states, a novel method of clearing the brush and tree roots was used in preparation for runway construction. The 10-acre area of the site chosen had to be cleared not only of timber but also of an exceptionally heavy growth of hazels, blackberry bushes and sagebrush. Removing the trees, stumps, and brush presented no particular problem, but the contract, awarded to R. B. Tyler & Co., of Louisville, Ky., required that as part of the subgrade preparation, the heavy matted and tangled root systems be removed completely. This root removal was complicated not only by the dense interwoven matting but also by the tough resistant tree roots, many 2 inches in diameter, which were left after the stumps were cleared.

John Crockett, Division Superintendent for R. B. Tyler, found the answer to this problem and saved several thousand dollars in time and labor. Previously on a number of soil-stabilization jobs, Crockett had used Seaman mixers for in-place mixing and also, on several occasions, to dehydrate aggregate and other materials. In the latter operation, the hood of the mixing chamber is raised so that the revolving tines forcibly throw the damp materials into the air in a long arc behind the machine. Crockett had noticed that, contrary to experience in mixing operations when the hood is fastened down to obtain uniformity of mix, when the hood was up, larger objects such as stones were left on the surface after the mixer had passed.

Therefore, after the brush and stumps were removed, heavy disks were used to cut the roots into segments. Then two Seaman mixers, one the motorized MHD-72 and the other a motorized air-borne ABM unit, were put on the job. With hoods raised, the machines dug out the root segments and sagebrush to the required 6-inch depth and left them on the surface. Roots which the disks had not completely cut were severed by the force of the mixer tines.

A Seaman mixer powered by a Waukesha motor clearing roots from the site of an airfield in the south.

A dump rake was then used to gather up the roots into windrows, which were later bulldozed into piles 25 to 30 feet in diameter and 10 to 12 feet high, for burning. Some idea of the tremendous root growth removed is given by the fact that 1,200 such piles were burned simultaneously on the 10-acre area.

Let 'Em Have It! Buy More War Bonds!

New 1944 AASHO Officers

At its Twenty-Ninth Annual Meeting in Chicago, December 1 to 3, 1943, the American Association of State Highway Officials elected as its President Samuel C. Hadden, Chairman, State Highway Commission of Indiana, to succeed Brady Gentry, Chairman of the Texas State Highway Commission.

Other officers elected included H. A. MacDonald, Commissioner of Public Works of Massachusetts, as First Vice President and the following Regional Vice Presidents: Ezra B. Whitman, Chairman of the Maryland State Roads Commission; C. W. Phillips, Commissioner of the Tennessee Department of Highways and Public Works; Hal G. Sours, Ohio Director of Highways; and Burwell Bantz, Director of Highways for the State of Washington.

The newly elected members of the Executive Committee are M. J. Hoffmann, Minnesota Commissioner of Highways, and J. S. Williamson, Chief, South Carolina State Highway Commission.

Rebuild your TRACTOR GROUSERS WITH BULLDOG Grip-Lugs

EASILY WELDED

Send for Bulletin "C-1"

INCREASES TRACTION EFFICIENCY

A QUICK AND ECONOMICAL REPAIR

ALLIED STEEL PRODUCTS, INC.

N. B. C. Bldg. Cleveland 14, Ohio

CHECK YOUR OPERATIONS for Maximum Dozer Use

Use this handy LeTourneau check-list

It's planned to cover your complete clearing & earthmoving cycle . . . shows you what to look for at every operating step

It pays to check your equipment operating procedure regularly. If you feel that you're not getting maximum use from your tractor-Dozer rigs, use this simple LeTourneau check-list. It will quickly show you where your job is falling down and what to do to correct the situation.

Here's More Help

To keep your tractor operators and repair crews informed on the most practical operating, service and repair practices, The LeTourneau Co-Operator is offered to you and your men FREE. Published 10 times yearly. Read regularly by over 50,000 contractors, miners, loggers and others who operate and care for LeTourneau equipment . . . write for your copies TODAY. Just address: Dept. CEM-1, R. G. LeTourneau, Inc., Peoria, Illinois.

LeTourneau Dozer building a logging skid road along a steep mountainside near Disston, Oregon. This smart operator keeps the cut low on the inside next to the bank. This keeps the tractor leaning slightly toward the bank and eliminates tendency for tractor to slip off the edge of the loose fill.

CLEARING . . . Check These Points ✔

1. Use your largest, heaviest tractors and Dozers to take out trees up to 3 feet in diameter. Here's how . . .
2. Check tree to remove dead limbs that might fall and injure operator.
3. Saucer out dirt to cut roots opposite "fall" side of tree.
4. Take a bite on either side of stump to cut and loosen roots.
5. Apply Dozer blade high up trunk for extra leverage and rock tree a few times to loosen—then push tree over and/or . . .
6. Reach blade under root ball for final push.
7. In all clearing and Dozer earthmoving operations, use LeTourneau front end Power Unit wherever possible; this leaves rear of tractor free for mounting LeTourneau 2-drum Power Control Unit to operate Carryalls, Tractor Cranes, etc.

LOADS . . . Check These Points ✔

1. Dozer bowl should always carry a heaping load.
2. Tractor motor should be working under full load by keeping up a full r.p.m.
3. Correctly set the blade—angled or straight, tilted or level—for the work.

TRAVELING . . . Check These Points ✔

1. 1½ m.p.h. travel speed—or low gear—should be used.
2. Back-up should be made in the highest gear possible.
3. Efficient haul distances should be no longer than 200 or 300 feet.
4. Doze loads in a trench or "slot" wherever possible.
5. Always doze downhill with loads. It's almost always possible.
6. Where 2 or more tractors are available—work them side-by-side to move an extra yard or two between Dozer bowls.

SPREADING . . . Check These Points ✔

1. Spread as quickly as possible.
2. Spread earth in lifts or layers as required and get rid of it quickly.
3. As soon as spread is completed, don't waste time beginning back-up or return.

MECHANICAL—(Check with LeTourneau Maintenance Manuals)

1. Check all adjustments on Power Control Unit and Dozer.
2. Blades should be installed properly to keep sharp.
3. Cable must be free from binding and all sheaves running free.
4. Lubricate sheave bearings every 8 hours.
5. If rear Power Control Unit is used, right-hand drum should carry cable.

Check with Your Dealer—If your check-up shows a need for repairs or parts, call your LeTourneau-"Caterpillar" distributor—he's completely equipped to handle your repair job quickly, thus reduce costly down-time. Check with him NOW.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

The Heet-Master tank for degreasing solutions to clean engines and parts.

Hot Dipping Tanks For Degreasing Parts

The thorough degreasing of small parts, pistons, crankshafts, and cylinder blocks is the first step in the careful overhaul of an engine. Heet-Master hot-liquid dipping tanks for cleaning engines and parts, made by Aeroil Burner Co., Inc., West New York, N. J., come in various sizes using natural or manufactured gas, liquefied petroleum gas, kerosene or electritcy for heat.

The feature of the Heet-Master tanks is the saving in fuel because the heat is delivered in the liquid, not under it, as the burner is in the tank, and the temperature of the degreasing liquid is under constant control. By turning two wing screws the entire tube heating unit can be lifted out, making the cleaning of the muck from the bottom of the tank an easy matter.

A heavy removable grille in the larger tanks will hold the heaviest load required in this work, while the smaller tanks have two dipping baskets for small parts. These baskets are built with angle-iron frames welded at all joints and the sides are 16-gage diamond expanded metal wire mesh. The bottom is the same mesh doubled for strength. Round iron handles inside the baskets permit easy handling and save space.

Bulletin No. 270, recently released by Aeroil, contains full information on all sizes of Heet-Master hot-liquid dipping tanks. A copy will be sent promptly by the manufacturer to those mentioning this descriptive text.

A Backstand Idler For Fast Grinding

A new backstand idler which adapts grinding and polishing lathes, or jacks, to abrasive belt grinding has recently been announced by the Porter-Cable Machine Co., Syracuse 8, N. Y. Heretofore, it has been necessary to coat the grinding and polishing wheels with the abrasive or use a solid stone wheel. The backstand idler makes possible the use of an endless metal cutting abrasive belt which is faster cutting, and design finishes are more easily obtained. Further, heat is greatly reduced because of the length of the abrasive belt used. This lower temperature operation decreases such hazards as heat discoloration, warping and fracturing.

Where it has been customary to grind, rough-polish and finish on regular wheels, the same results are obtainable by the abrasive belt method, according to users, but the rough-polishing operation can be eliminated. These factors have a tendency to lower grinding and polishing costs.

The new Porter-Cable Model ABS backstand idler is recommended by the manufacturer for grinding welds, flash, generating radii, flat and edge work, cleaning up and polishing. Any width belt up to 6 inches can be used.

Further information is contained in Form No. 631 which may be secured from the manufacturer.

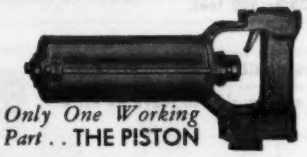
Highway Across Andes To Ecuadorian Jungle

The first line of penetration by modern highway into the Ecuadorian Oriente, that vast sparsely populated jungle stretching from the eastern base of the Andes to the Amazon headwaters, has been completed with the opening of the Banos-Mera motor road. This is one of four development roads being pushed by the Ecuadorian Ministry of National Defense into the undeveloped region east of the Andes where wild rubber and other strategic forest products are found and where large oil reserves are believed to exist. Except for a few small colonies along its fringe, the Oriente is inhabited only by Indians.

The Banos-Mera road connects with an oil-company airport about 5 miles beyond Mera, making possible the transport of gasoline and other supplies to the airport by truck.

One of the other three Oriente development roads will extend 97.5 miles from Tulcan to La Barquilla, of which 27 miles has been completed and another 11 are under construction. The third road will extend from Quito to Rio Napa, a distance of 118 miles, of which 38 miles has been completed. The fourth development road will extend 70 miles from Paute to Mendez, of which 12 miles is almost completed. All four of the roads are connected with the Pan-American Highway running through Ecuador.

SYNTRON
ELECTRIC HAMMERS



Only One Working Part . . THE PISTON will do a good job

Cutting and Chipping Concrete and Masonry

and will also save you time and money by drilling holes for installing railings, scaling old paint, rust and concrete from equipment, etc.

3600 powerful blows per minute from ordinary 110-volt AC lighting current.

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HOMER CITY, PA.

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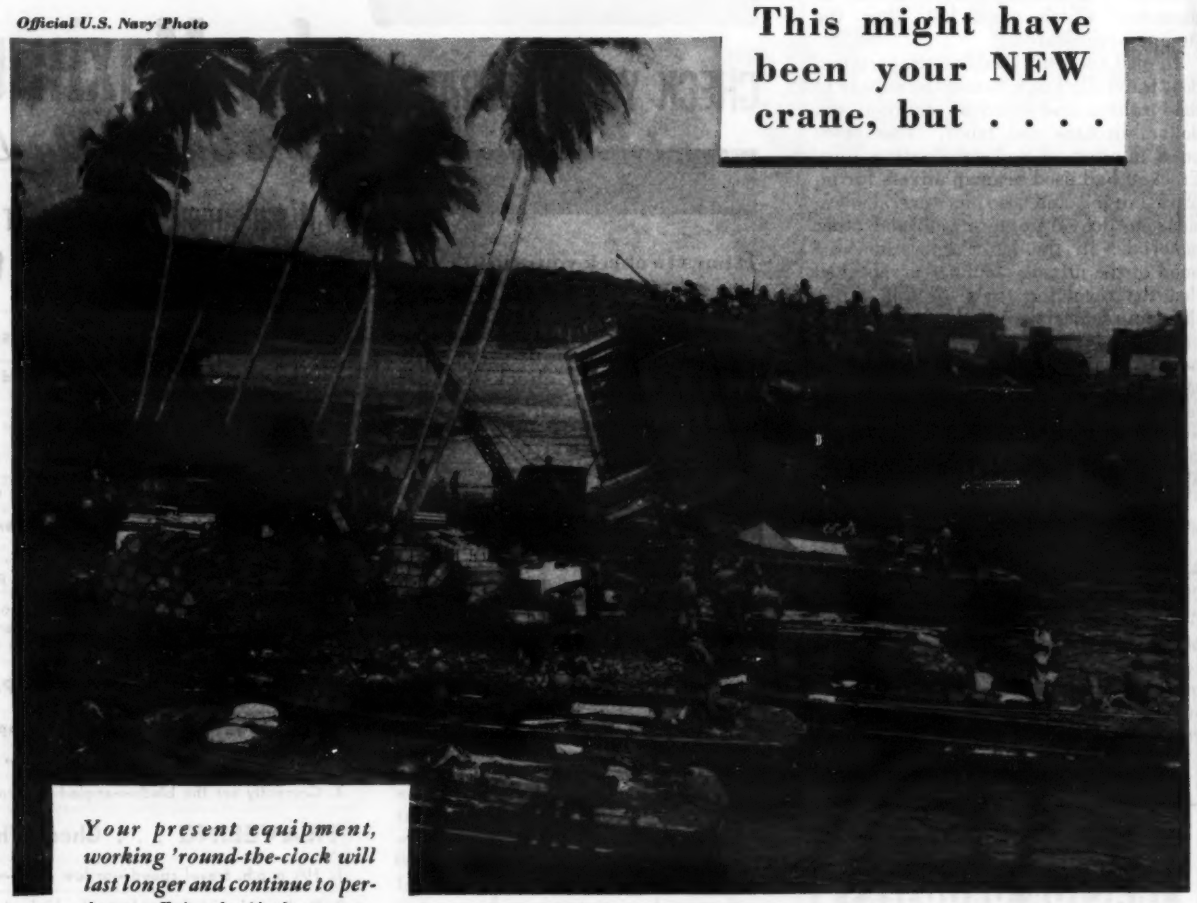


This might have been your NEW crane, but . . . .

Your present equipment, working 'round-the-clock will last longer and continue to perform efficiently if these common-sense rules are followed:

- insure proper regular lubrication.
- provide daily inspection to detect troubles while they are still small
- make adjustments when needed —don't wait
- tighten loose bolts and nuts
- keep fuel, lubricants and water clean
- remove clutch and brake bands and clean lining with good grade of clear gasoline
- change cables end-for-end to increase life of wire rope
- plan work to favor machine
- inspect engine regularly—flush radiator when dirty
- always give model and serial numbers when ordering repairs
- contact your BAY CITY distributor for parts and service.

here again BAY CITY helps keep the supply lines moving at Rendova

Wherever the bow doors of an LST swing wide to emit a flow of supplies to support a new advance against the enemy, you will usually find modern excavating and material handling equipment speeding the job. Here at Rendova Island, a BAY CITY convertible crane helps prepare the way for the capture of nearby Munda. Your new equipment has gone to war—let your dollars follow by investing in War Bonds. Yes, every Bond you buy now can be ear-marked for new equipment to take care of your post-war needs. BAY CITY shovels, cranes and draglines will be available with both crawler and pneumatic tire mounting. Why not write for catalogs so you will have them when needed? BAY CITY SHOVELS, Inc., Bay City, Mich.

BAY CITY SHOVELS
½ Sizes
¾ to 1½ Yard
Also truck mounted shovels and cranes

BAY CITY
SHOVELS • CRANES • DRAGLINES • TRENCH-HOES • SKIMMERS

Present and Future Needs of Highways

Thos. H. MacDonald Speaks Of This Winter's Problem, Dwindling Construction, and Post-War Work to AASHO

✦ THERE are many subjects sufficiently important to receive joint state and Federal consideration at this time. The deterioration of highways and bridges caused by the increased frequency of use by the heavier units, and curtailment of replacements and adequate repairs too drastic for anything but all-out war conditions, present currently the most acute problem. We must have more materials and equipment if we are to keep our highways in operating condition through the coming winter and next spring. When the history of this war period is carefully reviewed, serious students will certainly question why such meager provision has prevailed for the maintenance and replacement of the facilities and plants of land transportation which are so essentially a part both of war production and war operations, disregarding the factor of preservation of the civilian economy.

Snow Fighting Critical

We are now facing a period of even more intensive maintenance. An immediate necessity is preparedness for snow removal. Normally 534,452 miles are thus maintained, and a recent canvass of the states of their immediate needs aggregates estimates of 2,551 trucks and 3,768 other pieces of equipment, totaling approximately $13,000,000 in value. In addition, a most critical need is an adequate supply of repair parts to keep existing equipment in reasonably continuous operation. Such an adequate supply, only to June 30, 1944, is estimated at $9,000,000.

The Procurement Division of the Treasury is taking over all surplus equipment from Federal agencies, and will extend to the states the first choice of such equipment at agreed prices. Recently a communication has been addressed to General Somervell, in command of the Army Service Forces, by the Highway Traffic Advisory Committee, requesting the assistance of the Zone Transportation Officers of the Service Commands in passing upon and supporting the needs for winter maintenance equipment. Already considerable help has been given in this respect by these officers of the Transportation Corps.

New Construction Dwindling

The program of new construction is rapidly dwindling, as shown by the following table:

Year	Highway Placed Under Construction
1940	11,842.6 miles
1941	8,645.4 "
1942	1,869.2 "
1943	722.4 "

This year the rate of new project inception is but 39 per cent of that in the first war year and only 6 per cent of a normal peacetime rate. The mileage of projects completed has held up a little better, as shown by the following data for the same periods:

Year	Highways Completed
1940	8,849.6 miles
1941	7,911.2 "
1942	5,631.8 "
1943	2,376.8 "

The 1943 completion rate is about 42 per cent of that in the previous year and some 27 per cent of the normal rate. The higher completion rate in relation to the very low rate of starting new projects has substantially reduced the reservoir of mileage under construction. At the end of October in each of these years the following mileage was under construction:

Year	Under Construction In October
1940	9,082.6 miles
1941	8,471.2 "
1942	3,903.2 "
1943	1,512.9 "

If this situation continues, the reservoir will soon be dry.

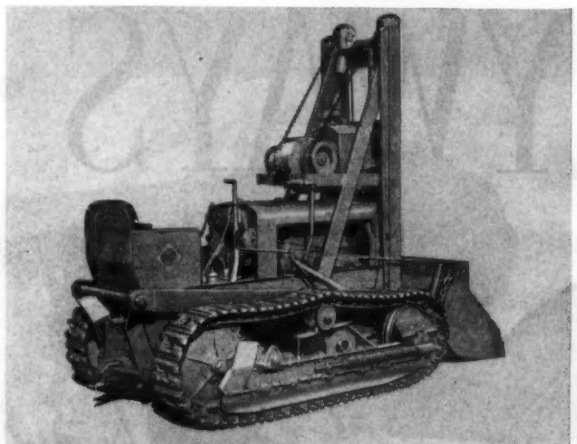
While no comparable mileage figures are available for state highway construction, exclusive of Federal-Aid work, comparative employment data indicate that such work has been reduced in even greater degree. In the first nine months of 1943, construction employment on Federal-Aid work was 69 per cent of that in the same period of 1942. The corresponding percentage for state construction is 59 per cent. In spite of the drop in needed replacement construction, state maintenance activity has been further reduced, employment in 1943 being but 85 per cent of that in 1942.

New construction over a long period, particularly work permitted during the war years, is very largely devoted only to replacing worn-out or inadequate sections of existing highways which are a national liability in terms of loss of operating time and depreciation of vehicles and tires, which we cannot afford. It is impossible now to recapture time lost in essential war transportation, to replace worn-out vehicles, or to absorb wasteful use of rubber. It is not impossible to do a limited amount of new construction that will avoid a material amount of these losses.

Future Program

The future program of highway construction is divided into two parts: (1)

(*Concluded on page* 39)



Extra Duties
Which Keep Hough Shovels Busy

Snow removal and loading — ditch and stream cleaning — handling catch basin and sweeper refuse — loading under viaducts, underpasses or indoors—tree removal and loading — handling pipe, poles, ties, rails and culverts — charging asphalt and concrete mixers — and hundreds of other time-saving applications. The tractor is, of course, adaptable to all normal uses.

Lubricating Schedules For Today! With new Hough Cable Operated Tractor Shovels difficult to procure, those in service are being operated far in excess of normal hours; which implies the need for greater lubrication and maintenance care. Hough equipment will function faithfully for long periods if proper maintenance practices are observed.

In the matter of lubrication, take a tip from the U. S. Engineers, whose *greasing period is eight hours instead of one day*. The crew finishing an eight hour shift lubricates all points indicated for "once a day" lubrication. At the end of the second eight hour shift, the crew going off duty lubricates all "once a day" points, and any "two day" points which may be shown. This schedule is carried out through multiples of eight hours to the equivalent of the period when the equipment should receive a general overhaul.

Use only clean SAE 10 oil (U. S. Engineers OE 10). Keep wear strip and guide frames well greased. Change the oil filter element frequently; flush hydraulic system every 400 hours.

If you treat your Hough Shovels right, they will serve you long and well. Can we help you with your operating and maintenance problems?

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"HUFF"

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THE FRANK G. HOUGH CO.
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"Since 1920"

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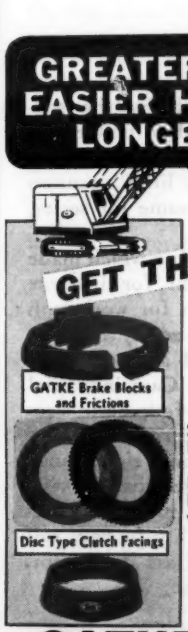
EASIER HANDLING
LONGER LIFE



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Clutch Facings
Frictions
Non-Metallic Bearings
Sheet Packing

GATKE CORPORATION
224 W. LaSalle St., Chicago 1, Ill.

New Overseas Highway To Key West, Florida

(*Continued from page* 1)

nature, the remoteness of the work from centers of labor supply, and the fact that most contractors were already overloaded with more attractive contracts, the responses were few.

Two contracts for bridges were awarded to Cleary Brothers Construction Co. of West Palm Beach. These two contracts, aggregating $1,087,822.92, were for the construction of the following bridges:

NAME OF BRIDGE	TOTAL LENGTH
Boca Chica Channel	2,573 feet
Rockland Channel	1,230 "
Shark Channel	1,988 "
Saddle Bunch Channel	800 "
Saddle Bunch No. 4 Channel	800 "
Saddle Bunch No. 3 Channel	656 "
Saddle Bunch No. 2 Channel	554 "
Lower Sugarloaf Channel	1,210 "
Harris Channel	390 "
Harris Gap Channel	34 "
North Harris Channel	390 "
Park Channel	779 "
Bow Channel	1,302 "
Kemp Channel	992 "
Niles Channel	4,433 "
Torch-Ramrod Channel	615 "
Torch Channel	779 "
South Pine Channel	806 "
North Pine Channel	620 "
Jewfish Creek	224 "

After these two contracts had been successfully awarded, it was decided that the remaining portions of the construction could be done most advantageously by state forces who started work on November 1, 1942, on 42.5 miles of the 84.5 miles of highway construction, at an estimated cost of approximately $1,200,000, and three bridges at an estimated cost of $95,291, as follows:

STATE-BUILT BRIDGES	TOTAL LENGTH
Tavernier Creek	132.5 feet
Snake Creek	192.5 feet
Teatable Key Relief Channel	225.5 feet

Owing to the shortage of men and equipment, the State Road Department again called for bids on the remaining portion of the highway, and on March 23, 1943, a contract was awarded to Groves, Lundin & Cox of Minneapolis, Minn., to construct 42 miles of the highway for $1,300,000.

Because of the remote location of the work, it was necessary to provide living accommodations for the personnel and one of the major problems has been to house comfortably and feed satisfactorily the many workmen, both white and black, employed in the state-managed construction. Despite the restrictions of wartime rationing and the universal tendency of construction men to feel that any-place-else is better than where they are, a sufficient crew of workmen was kept on the job, through good weather and bad, to complete the undertaking in the allotted time and in the specified manner.

Value of the Improvement

To the current war effort the completed highway is of inestimable value. Key West, the southernmost city of the United States, is the site of installations essential to our national defense. It is a stepping stone to our Caribbean bases and in the event of an enemy attack on them or the Panama Canal, our ability to transport men and supplies rapidly to Key West might mean the difference between success and failure.

After the war, automobile ferries will connect Key West with Havana, to which it is closer than it is to any city on the American mainland. By this route an automobile tour of a foreign country awaits the traveler of average means.

Personnel

The Overseas Highway has been constructed jointly by the Florida State Road Department and the Public Roads Administration as an access road and a part of the strategic network. All construction was done under the direction of the Florida State Road Department, J. H. Dowling, Chief Engineer.

New Price Regulation For Leased Equipment

A new pricing arrangement for leasing construction and road-maintenance equipment to contractors by the War and Navy Departments and other Government agencies was announced recently by the Office of Price Administration. This action will relieve the Government of the cost for supervisory personnel required for inspecting repairs.

Under existing regulations, the lessor must bear the expense of all repairs to leased equipment necessitated by normal wear and tear, and the Army and Navy have been required to inspect every repair made by lessees to determine the cause of the breakdown and what proportion of the cost should be charged to the Government. The new arrangement provides for a simpler alternative method so that the War and Navy Departments can comply with OPA's controls covering rental of equipment.

This Amendment 13 to Maximum Price Regulation 134 (Construction and Road-Maintenance Equipment Rental Prices and Charges for Operating and Maintenance or Repair and Rebuilding Charges), which became effective November 30, 1943, allows the Army and Navy to require their lessees to make all repairs and replacements at their own expense, conditional on a reduction in the rental rates charged by the Army and Navy, providing that the maximum rates to the lessee will not exceed 85 per cent of the maximum rates in the Regulation. The 15-per-cent reduction in rental rates will properly reimburse lessees for the portion of costs and repairs which previously would have been borne by the lessor.

It is pointed out, however, that this action does not shift to the contractor the burden of repairing pre-existing or hidden defects that may become manifest and cause breakdowns while the equipment is in his hands.

Braided Wire-Rope Slings

The features of Macwhyte Atlas braided wire-rope slings for handling loads safely are described in a new bulletin issued by the Macwhyte Co. The patented construction of these slings is designed for safety, efficiency and economy.

Copies of the bulletin and full information on Macwhyte Atlas slings may be secured by those interested direct from the Macwhyte Co., Kenosha, Wis. Just mention this item.

NEED A BIG Trailer?

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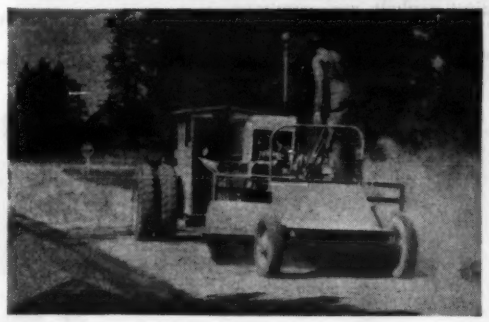

HIGHWAYS

Case Power Sees Things Through

A secret weapon in the North African rout of Rommel was the air-borne tractor. As the fleeing enemy blew up its airfields and hurried away, big transport planes bumped down among the bomb craters. In half a minute the air-borne tractors rolled out, ready to hook onto air-borne graders, loaders, pulvi-mixers . . . a complete array of earth-working machines. Only three days later a wrecked enemy field had become an Allied airfield, from which bombers and fighters flew to shield our soldiers and save their lives.

The Case air-borne tractor, shown in the picture above, is lighter and more compact than the corresponding size of Case industrial tractor. It gets its extra traction weight with earth or sand shovelled into the box behind. But its vitals . . . its pistons and cylinder sleeves, valves and shafts, gears and bearings . . . are the same as in the Case Model "SI."

Tractors fit to fly the skyways were no quick creation. Some seventy years ago Jerome I. Case began to build steam traction engines. More than fifty years ago the first gas tractor was built in the Case factory. As pulling power and as road rollers they played a worthy part in weaving for America its network of roads.

Out of the experience of all those years, plus firm devotion to a purpose, have come the qualities which are the character of Case power—sturdy simplicity, ease of handling, economy of fuel and upkeep, and above all ENDURANCE. Both by the sustained eagerness of their power and by their ability to work long hours and long years with little attention they have earned a name for seeing things through.

The same adaptability which made Case tractors a "natural" for air-borne service also fits them for work with cranes, snow plows, rotary brushes, loaders, winches and all manner of mounted equipment. Case industrial tractors are built in four basic sizes with varied wheel and rim equipment to cover an unbroken weight range from 2500 to more than 10,000 pounds. For full information, including possible availability to you, call or write your own Case distributor. J. I. Case Co., Racine, Wis.

CASE

KEEP ON BUYING BONDS
•• TO SEE THINGS THROUGH

Gravel Pit Opened, Speeds State Work

Grading, Drainage and Base Course, Prime and a Single Surface Treatment Running 10.464 Miles on Ala. 41

✦ PROJECT S 160-B of the Alabama Highway Department, extending for 10.464 miles from Marion to the Hale County line on State Route 41, offers an interesting example of the methods used on state projects to insure economy and speed of completion. The initial need for this job was a satisfactory source of stabilizing material for base course within a reasonable hauling distance. This was solved, and other needed aggregate also secured, by opening a new sand and gravel deposit on the Cahaba River near the large U. S. Fish Hatchery and close to Alabama Highway 5.

Opening the Pit

On the state project there was no local base-course material available of sufficient structural value to support a paved surface. This made it necessary to use a stabilizing material in the top 4 inches of the 8-inch base course.

Analysis of the Cahaba River deposit showed that mat and plant-mix aggregates could be produced economically, in addition to stabilizer material. Consequently, a screening plant was put into operation by the state. A Diamond portable sand and gravel plant with vibrating screens was set up, with an Allis-Chalmers HD-10 tractor to bulldoze the pit-run material to the bucket elevator of the plant. This plant produced approximately 80 tons of graded cover aggregate and 480 tons of stabilizing material per 10-hour day, or 110 tons of cover material and 390 tons of plant-mix-seal aggregate. The plant was operated by convict labor.

Stabilizing the Base

The work on Project S 160-B produced a stabilized base 26 feet wide for a 22-foot pavement on a 32-foot width between the tops of the ditch slopes. The first operation was to compact the bottom 4 inches of the base ahead of stabilizing the top 4 inches. This was done by disking, harrowing, and blading the bottom layer, with added moisture, until thoroughly mixed. It was then compacted by sheepsfoot rollers and finally pneumatic rollers to 100 per cent of standard Proctor density.

On this, 25 cubic yards per station of sand-gravel, graded from ¾-inch down to No. 40 material, was spread uniformly over the compacted section and scarified, harrowed, and disked to a uniform mix with the sand-clay provided for binder in the top 4 inches of the base, and then wet and rolled to 100 per cent standard Proctor density. The equipment used for these operations included an Allis-Chalmers tractor for pulling the disks, harrows, and sheepsfoot roller, and a Galion power grader for mixing and spreading.

An important point in this work was the handling of the natural sand-clay subgrade material for the bottom 4 inches of the base course. This was thoroughly worked and pulverized *dry* before wetting for the final compaction. Failure to do this invariably causes scaling of the surface of the sand-clay mix due to uneven distribution of the clay in the mix.

The base course, completed and reasonably dry, was primed with RT-2 at 0.27 to 0.30 gallon per square yard and allowed to cure. The single surface treatment consisted of an application of 0.42 to 0.45 gallon of RT-11 per square yard and covering with 0.5 cubic foot of No. 4B gravel from the new pit per square yard. This was spread by St. Paul spreader boxes at the rate of ½ cubic foot per square yard, hand-spotted, and rolled by a 5 to 7-ton Galion tandem roller.

For completion with a pre-mix seal, the surface was later given a tack coat of 0.12 gallon of RC-2 per square yard and then 60 pounds, per square yard, of the plant-mix material spread and rolled.

The specifications for the aggregate and plant-mix used in this work were as follows:

C. & E. M. Photo

This complete state-owned sand and gravel plant was speedily set up to produce gravel for the base course on a 10.464-mile state-labor job on Alabama Route 41.

SPECIFIED GRADATION OF NO. 4B AGGREGATE

Passing 1¼-inch sieve		100 per cent
" 1- " "	90 to 100	" "
" ⅜- " "	20 to 60	" "
" ⅛- " "	0 to 10	" "
" No. 4 "	0 to 2	" "

SPECIFICATIONS FOR PLANT-MIX SEAL

Passing ½-inch square sieve		100 per cent
" ⅜- " " "	85 to 100	" "
" No. 4 " "	40 to 90	" "
" No. 10 " "	25 to 80	" "
" No. 40 " "	4 to 45	" "
" No. 200 " "	0 to 8	" "
Bitumen	4 to 8	" "

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Concrete Heaters
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IN the last stages of the struggle for Victory it is more important than ever that engines be maintained at a high degree of operating efficiency. Give your BUDA Diesel proper care with definite periodic maintenance and help save critical materials for Victory equipment.

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. . . don't make it!
Every engine part you save means one more for the battlefront. Take care of your engine *regularly*—check your instruction book for details on lubrication and service.

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ORDINARY DIESELS
. . . High cylinder pressures produce sledge-hammer blows that punish pistons, rods and crankshaft every power stroke.

BUDA
Low-Pressure DIESELS
Prolonged "Low-pressure" combustion delivers a smooth, steady power stroke that cuts vibration saves parts.

The LaPlant-Choate Airborne scraper.

New Compact Scraper For Airborne Service

Although developed especially for use by the U. S. Airborne Aviation Engineers, the new LaPlant-Choate Airborne dirt-moving scraper has many peacetime applications in the construction field. Because of its light-weight design and low cost, it is particularly adaptable to landscaping and roadside development projects, for constructing and maintaining ditches on county roads, for building ponds for water conservation, and many similar jobs where a small light-weight tractor-scraper unit is desirable. This scraper is planned for use with tractors employed by the Airborne Engineers, but on peacetime jobs it will be suited for use with the small Caterpillar D2 tractor although its size will be increased proportional to the tractor.

This Airborne unit is a small "pocket-size edition", 147 inches long and 64 inches wide, with a 1¾-cubic-yard struck capacity or 2-yard heaped capacity, and was designed for loading into the door of a transport plane or glider. The rear of the frame is so constructed that the rear wheels can be located either inside or outside the width of the cut. In the latter position, greater stability is provided for side sloping. Its design enables the scraper to make a full 90-degree turn or less within a circle diameter of 20 feet, without overturning, the manufacturer states.

The scraper is of the front-dump type, and as the bowl tilts forward, the apron automatically opens to allow clean easy dumping. Spreading of the load is accurately controlled from 7 to 12 inches. Both the bowl and apron of this model are hydraulically operated by LaPlant-Choate's newly designed hydraulic system. The hydraulic pump is located on and driven by the tractor, while two double-acting jacks control the movement of the scraper bowl and apron. A three-position valve raises, lowers, and holds the cutting edge in position, and exerts the necessary down pressure for effective operation. By means of this down pressure, the total weight of the scraper can be placed on the cutting edge to force the machine to dig. The same force regulates the cut from 0 to 6½ inches. The rear wheels can be placed inside the cut to produce smooth finished work. Sufficient clearance under the bowl is provided, which, with the short wheelbase, enables the scraper to be used on soft fills and rough terrain without "hi-centering".

Contractors and state and highway engineers who are making plans for post-war purchases of equipment may secure further information on this LaPlant-Choate Airborne scraper and its adaptations to peacetime construction direct from the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa.

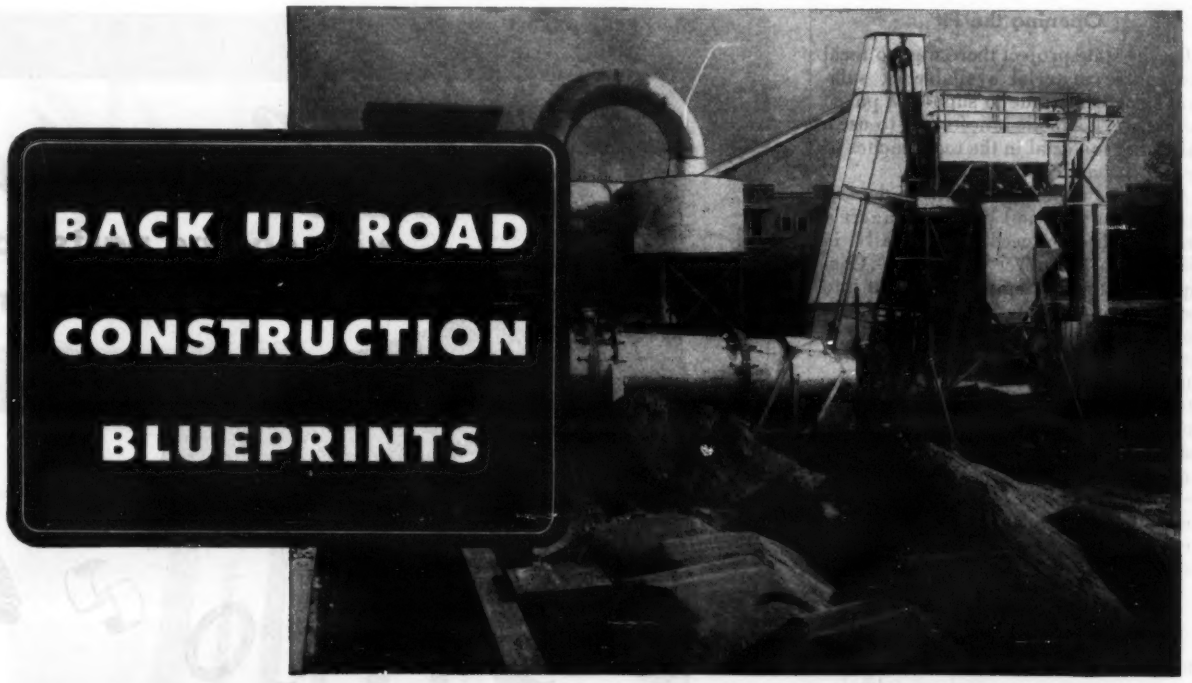
Stretching the Life Of Rubber Belting

A repair material which can be used on breaks, burnt or worn spots in conveyor belts or for filling holes and for resurfacing industrial belts of all types, whether of rubber, rubber composition, leather, or cotton, is now being made with synthetic rubber by So-Lo Works, Inc., Loveland, Ohio. The manufacturer claims that it will greatly lengthen the life of belts and permit continued use of some conveyor belts that might otherwise be discarded.

Industrial So-Lo is said to have a high resistance to oil and grease, little shrinkage, spreads easily, and dries smoothly. It consists of a cement primer and a mastic. The belt surface is roughened and the primer applied, followed by the mastic. It dries tough overnight and one quart covers approximately 14 square feet.

Other uses of Industrial So-Lo are for resurfacing metal, wood, and composition pulleys, to which it readily adheres, preventing slipping and thus cutting down wear. It may be used to safeguard workers by applying it as an insulator over switch handles and other electrical devices and it prevents slipping when applied to metal and concrete stair treads. The product is also used in repairing rubber boots and gloves.

Complete information including the price may be secured direct from the manufacturer by mentioning this descriptive text.



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FACTS EVERY CONTRACTOR SHOULD KNOW

Madsen has 29 years of experience in designing and constructing asphalt plants.

The Madsen line of asphalt equipment is the most complete offered by any manufacturer.

Madsen pioneered many of the major developments in asphalt plant equipment.

Only Madsen plants can offer the four following features:

THE ETERNAL CHALLENGE to black top construction engineers, contractors, and equipment manufacturers is *speed*—and *speed* is what you get with Madsen Asphalt Paving Plants.

Owners and operators report:

"It is not unusual to mix in excess of 200 tons per hour with our 3000-lb. Madsen Plant."

"We produced 149,121 tons in 8 months with our 3000-lb. Madsen Plant."

"We mixed 75,920 tons from October 1 to December 8 with our 3000-lb. Madsen Plant."

"33,000 tons of asphaltic concrete was mixed by our Madsen Plant in 26 eight-hour days."

Madsen Plants offer synchronized plant operations accelerated to the faster mixing of the high speed Madsen pug mill mixer. Seconds are saved by asphalt pressure-injection—a Madsen patented exclusive feature. Additional time is saved in the mixing operation because the asphalt is quickly incorporated in the whirling aggregates. Only 4 to 6 seconds by stop watch are required to dump the batch. These seconds saved actually produce 25 to 40 more batches per 8-hr. day.

Madsen Plants are *completely* self-erecting. No ramps, skids, cranes, or extra equipment are required with the Madsen patented jack-erection system. That's why Madsen Plants are easier to erect and easier to dismantle and move.

Six sizes of asphalt plants, four sizes of oil-mix plants and the famous Road Pug travel-mix machine make up the Madsen line of bituminous equipment. For your future plans, write for catalog MP-120.

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HUNTINGTON PARK, CALIFORNIA

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4 EXCLUSIVE FEATURES ON EVERY MADSEN ASPHALT PLANT

1. Asphalt Pressure-Injection System
2. Sectional twin-shaft Pug Mill Mixer
3. Jack-Erection System and power lift
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Self-cleaning design, replaceable liners, longest life seal, heavy duty construction thruout.

Every unit individually tested and certified—you *know* you're getting the best.

Sizes 2000 to over 200,000 G.P.H.

52 Lb. Suction —3000 G.P.H.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

Silt-Sand Mix Paves Flight-Strip Runway

New Southeast Unit Has Dense Road-Mixed Runway On Base of Sand Stabilized With 52,000 Yards of Silt

✦ ON a Flight Strip in the southeastern section of the country, completed in September, 1943, and taken over by the U. S. Army, a most effective and efficient use was made of a soil generally considered structurally useless. Inorganic muck, a silt classified as an A-8 soil, was used to stabilize the A-3 sand of the area, and the two made up the mineral aggregate for a cut-back asphalt road-mixed runway of unusual hardness, the texture of which approached that of sheet asphalt with a fine sandpaper finish.

An area 650 feet wide and 8,000 feet long was cleared and grubbed of small pine and larger trees that had to be pulled down by tractor and cable which also effectively removed the stumps and roots from the ground. About 30 per cent of the area was holes of organic muck from 2 to 7 feet in depth, from which over 75,000 cubic yards of muck was removed by draglines, loaded into trucks, stockpiled to drain, and later used for dressing the shoulders of the runway. Three draglines were used, operating from the fills as they were bulldozed in by tractors. Local sand from small cuts within the Flight-Strip right-of-way area was used for the backfill.

Runway Base Stabilized

An area 6,000 feet long and 450 feet wide was stabilized, using silt from a pit 3 miles distant. The silt was reported by the soils engineers of the state highway department as having a bearing value of 220 pounds per square inch, while the sand which it was used to stabilize has a bearing value varying from 13 to 70 pounds. The stabilization was done in strips alternately 30 and 20 feet wide. The silt was spread, mixed, and compacted in two layers, the bottom 10-inch layer to a bearing of 40 pounds and the top 8-inch layer to a bearing of 70 pounds. Before placing any of the silt, the section to be worked was stripped of the top 8 inches of sand, which was split and windrowed one-half to each side on the adjacent 20-foot strips. Then the silt was dumped from the trucks on the 30-foot strip in piles sufficient for stabilizing a depth of 10 inches. The piles were knocked down by a bulldozer and then mixed with the 10 inches of sand below by means of a disk harrow. Skipping the adjacent 20-foot strip, the top 8 inches of sand in the next 30-foot strip was removed in a similar manner, the material piled on the two adjacent 20-foot strips, and the bottom 10 inches stabilized. Then the silt for stabilizing the top layer was spread over the bottom layer, and the sand which had been windrowed on the adjacent 20-foot areas was bladed over and mixed with the silt by disk harrows. Power graders were used for moving the material from side to side to mix laterally while the disk harrows did the vertical mixing. The bottom stabilized strip was compacted by sheepsfoot rollers, followed by power graders which brought up the crown finally to 1½ per cent for the stabilized section and later 1 per cent for the road-mixed material. Only the bottom layer of stabilized material was compacted by the sheepsfoot rollers, as the top layer was left loose for mixing with the asphalt. The 20-foot strips were worked in the same fashion, with the top-layer material windrowed on the adjacent stabilized 30-foot strips.

C. & E. M. Photo
The junction of the runway, left, and the access roadway at a southern Flight Strip, with a sprigged area in the foreground and background.

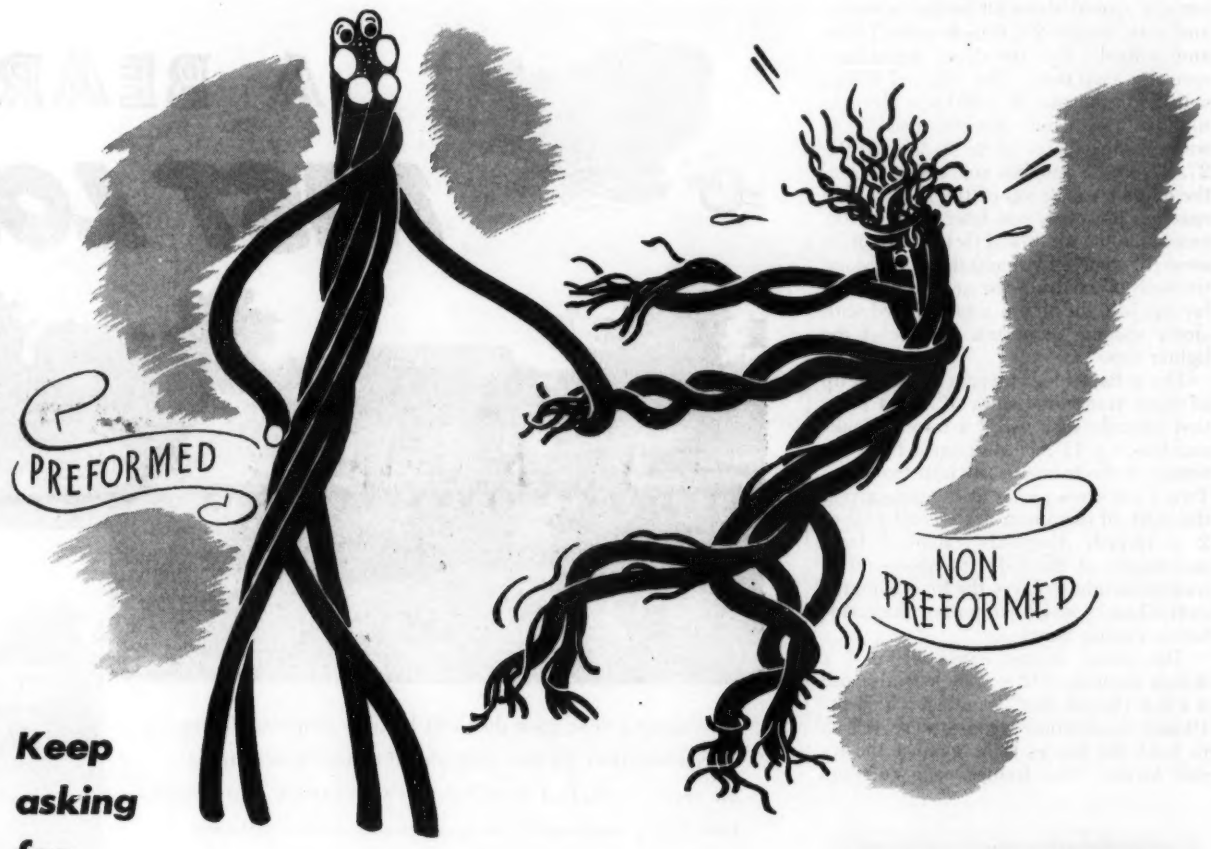
The analysis of an average stabilized sample which had a bearing value of 76 pounds per square inch before the application of the asphalt was as follows:

CLASSIFICATION	
Clay	3 per cent
Silt	5 per cent
Sand	92 per cent
GRADATION	
Passing a 40-mesh screen	93 per cent
Passing a 60-mesh screen	63 per cent
Passing a 200-mesh screen	9 per cent

Road-Mixing the Runway

RC-1 asphalt was used for the binder in road-mixing the stabilized upper layer

(*Concluded on page 24*)



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This is just *one* of the many advantages built into American Cable TRU-LAY Preformed—at the mill. Just *one* of the reasons why TRU-LAY Preformed wire rope is preferred and specified by so many operators. Specify it for your next line. It will steady your machine production; save you time, and prevent accidents.

Because . . . it resists kinking!

No wonder the Armed Forces take so much of our production!

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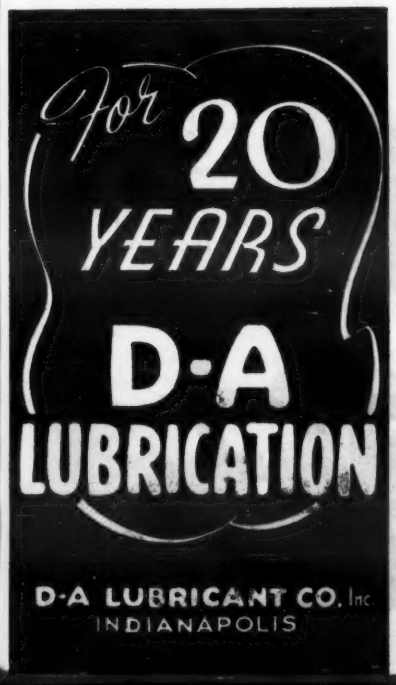
Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Tacoma, San Francisco
AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT, CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*



Collapsible Unit Form Features Culvert Job

(*Continued from page 2*)

part of the Bridge Superintendent showed that a wood form with collapsible wood centering could be built and re-used, thus saving a considerable amount of lumber. The removable form and centering were built on the job, using only a band saw and a few hand saws, and cost but $700. The form was sufficiently long to pour one fifth of the job at each set-up, the volume of concrete being such that it could be readily handled in one working day for each section. The form was built sufficiently long to take care of the two end sections, which are 52 feet 6 inches and 51 feet 6 inches in length, while the three center sections are each 36 feet long. The two end sections have slopes of 2 : 1 to match the slope of the fill placed over the top.

The outside and inside forms were built of 1-inch sheathing with 2 x 6-inch cut ribs spaced about 18 inches on center and with double 2 x 6-inch wales inside and outside for the Star Strip-Easy spreader snap ties. The original design called for the use of 5,000-pound-working-load ties which gave a spacing of wales on the inside of 9, 18, 21, 24, 24, 27, 27, and 27 inches successively from the haunch to the top of the arch. This spacing, however, was later changed because 5,000-pound-load ties could not be secured, but 3,000-pound-working-load ties were available. In order not to delay the job, the set-up was changed with closer spacing to permit the use of the lighter ties.

The collapsible centering was built up of three transverse rows of 4 x 4 posts tied laterally with two 2 x 6-inch planks and two 2 x 12-inch diagonals from the center of the frame to the lower corners. Two 2 x 8 cross pieces at the top carried the scaffold planking. A second pair of 2 x 12-inch diagonals extended from mid-height at the sides to about three-quarter height to carry the load from the radial braces which supported the inside forms during pouring.

The radial braces consisted of 4 x 4-inch timbers in 2 x 4-inch leads with 4 x 6 x 10-inch blocks against which the 10-inch hard-wood wedges were driven to hold the braces tight against the inside forms. The frames, each carrying five braces, were spaced 8 feet on centers, tied together by 2 x 6 planks at the bottom and mid-height, and 2 x 10-inch planks at the top. Continuous 4 x 4-inch timbers 12 feet long were nailed to the end of the radial braces to provide continuous support for the inside forms.

C. & E. M. Photos

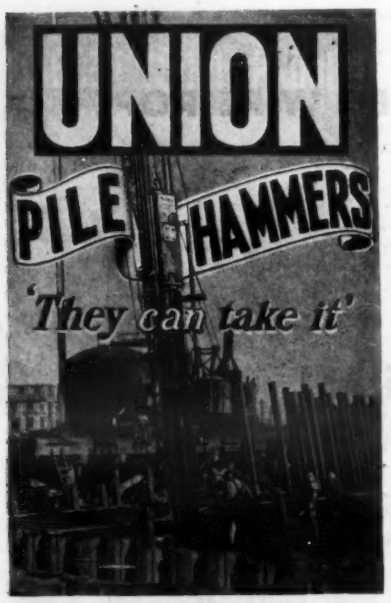
To make ready for pouring the next section of the 18 x 15-foot culvert, the inside wood forms were pulled forward by tackle after the centering had been retracted. The centering itself was then brought forward as shown at the left.

When it came time to move the form ahead, the radial braces were first retracted and the inside form pulled ahead the required distance. The wedges under the movable centering were then knocked out so that the centering could be moved forward on the 2-inch pipe rollers. Moving was effected by rope and tackle, using five men on the line. As soon as the centering was in place for the next pour, the wedges were driven under the base stringers to lift the centering off the rollers, and then the radial braces were extended by driving the wedges at the base of each one until the line and grade of the inside forms were correct.

Concreting

The footings for the culvert were poured consecutively from east to west for the full length, then the floor was poured, and last the two sides, bringing them up evenly. Forty-eight hours after the two sides were poured, the key at the top was poured. The contractor elected to use high-early-strength cement to speed the removal of the inside forms from 7 days down to 3 days. The day the beam break showed sufficient strength to permit stripping the forms, they were moved ahead and reset, the total operation requiring 8 hours.

(*Concluded on next page*)



Also manufacturers of:
Pile Driver Leads, Grout Mixer and Ejector, Mine and Shaft Cages, Skips and Buckets, Air Locks, Subaqueous Equipment, Tunnel Shields, Pile Driver Hoists.

EST. 1900
Union Iron Works, Inc.
ELIZABETH, New Jersey

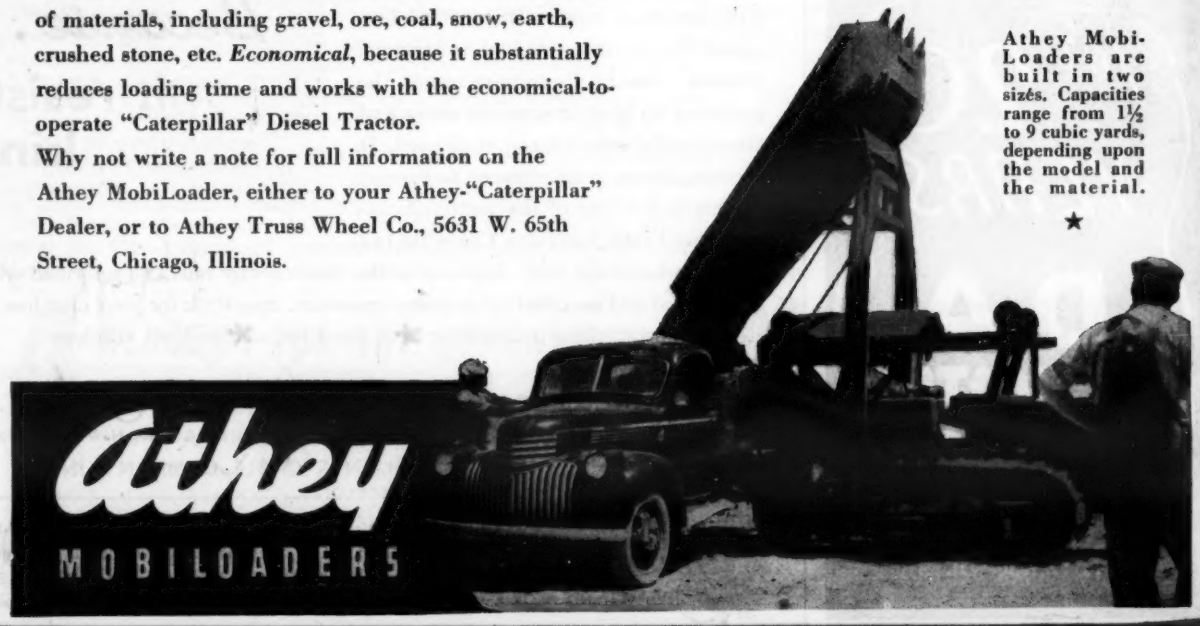
The closing year goes down in history as a year for speed in construction. In jumping ahead of the Axis nations on every score, fast production was essential. A time-saving tool that gained scores of new friends on the military and home front is the Athey MobiLoader. It's *fast*, because it's an overhead loader that digs and hauls bigger loads with no waste motions. It goes forward into a stockpile, with bucket down to dig its load, and travels directly back in reverse, discharging the material into the truck or fill. *Versatile*, because it can load a wide range of materials, including gravel, ore, coal, snow, earth, crushed stone, etc. *Economical*, because it substantially reduces loading time and works with the economical-to-operate "Caterpillar" Diesel Tractor.

Why not write a note for full information on the Athey MobiLoader, either to your Athey-"Caterpillar" Dealer, or to Athey Truss Wheel Co., 5631 W. 65th Street, Chicago, Illinois.

Loading Bauxite ore for Bauxite Co. of Alabama with Athey W4-1 MobiLoader. 4-yard trucks are loaded in less than 2 minutes this fast, simple way.

Athey Mobi-Loaders are built in two sizes. Capacities range from 1½ to 9 cubic yards, depending upon the model and the material.

★



Arched Culvert Built On Ohio Access Road

(*Continued from preceding page*)

Each pour required just a little less than 100 cubic yards of concrete, which was poured in about 4 hours from the same set-up as used for pouring the rigid-frame overpass structure adjacent and described in the accompanying article.

No forms were used for pouring the footings or the invert because of the firm character of the soil. The excavation was carried to the neat line, and the concrete poured against the undisturbed ground.

Major Quantities

The major quantities for the plain-concrete arched culvert were as follows:

Excavation, structure, unclassified	1,061 cu. yds.
Concrete, Class E, for footings	605 cu. yds.
Concrete, Class E, for barrel	492 cu. yds.
Waterproofing, 2 moppings and 1 layer of fabric	59 sq. yds.

Personnel

The contract for this access road project, DA-WI-10A (1), of which this plain-concrete arched culvert was a part, was awarded to The Horvitz Co., of Cleveland, Ohio, on its total bid of $1,299,183.42. Al Kohn was General Superintendent, and F. C. Shons was Bridge Superintendent and chiefly responsible for the contractor for the novel form work and organization of the concreting crew on this culvert. Walter Andersen was Project Engineer for the Ohio Department of Highways, for which Robert E. Willems is Division Engineer. H. G. Vours is Director of Highways in Ohio.

Johnston Urges Action On Post-War Projects

Eric A. Johnston, President of the United States Chamber of Commerce, in testimony recently before the House of Representatives Committee on Public Buildings and Grounds, advocated early action by Congress on a policy respecting the position of the construction industry and public works in the post-war program.

The adoption of a policy making clear to the country the following principles was urged by Mr. Johnston:

1. That Congress looks to the construction industry to eliminate its own peaks and valleys so far as possible and in that way to make its own contribution to providing useful employment, and does not expect that industry to stabilize our whole economy.

2. That Congress expects the city, county and state governments to finance their own ordinary local public works, such as water systems, street improvements, educational buildings and recreational facilities.

3. That the Federal government will correlate its own proper public works expenditures through a suitable agency in order that there may be certainty in regard to what the Federal government is going to do, and elimination of wasteful expenditures.

4. That the Federal government's public works will be undertaken through the contract method of public construction.

5. That the Federal government will not undertake any activities in the field of housing which will compete with private builders or interfere with the community's responsibility for the enforcement of minimum housing standards and the relief of needy families.

Mr. Johnston said that to make such a public policy on construction realistic, Congress should make suitable changes in tax laws with a view to the encouragement of private investment and reconversion to peacetime operations. Revision of tax structure, he said, also should be designed to make available additional sources of revenue to state and local governmental use, thus helping to free the states and municipalities from dependence upon the Federal government.

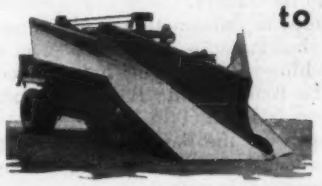
In elaborating his idea, Mr. Johnston said: "I am confident that if Congress would declare a policy and take active steps in these directions, it would serve as a powerful stimulus to private business and also to communities and states in the preparations they are making for useful construction work as soon as materials and labor become available. Some of this work, which is badly needed, may be able to go forward before the end of the war. If so, that will be all to the good. It will take up any employment slack which may occur as the war passes from one phase to another, and workers and materials become available. In addition, it will keep the construction industry, which is now on a minimum basis of operation, sufficiently organized to take up promptly its share of providing peacetime employment when the war is over."

Gar Wood Appointments

Announcement has been made by Gar Wood Industries, Inc., Detroit, Mich., of the assignment of Ross Miller to dual positions in the Hoist & Body Division for the duration. Mr. Miller, who has been associated with Gar Wood for a number of years in various capacities, has been made Service Manager and also placed in charge of production scheduling of hoist and body service parts. W. H. Lingner, who recently joined the organization, will serve as Mr. Miller's assistant.

L. F. Avery, whom Ross Miller succeeds, is now an expediter for Gar Wood Industries, Inc., residing in western Pennsylvania.

Open Highways are IMPORTANT to Wartime America



DAVENPORT-FRINK SNO-PLOWS are Doing Their Share

Order Repair Parts NOW

DAVENPORT BESLER CORPORATION Dept. A DAVENPORT, IOWA

Made in Eastern U.S.A. by CARL H. FRINK, 1000 Islands, CLAYTON, NEW YORK

How to be sure of finishing ANY compressed air job

You're assured continuous operation—from the time your compressed air job is started until it is finished—when you use a Schramm compressor.

Here's why: They're rugged, sturdy air compressors, designed to handle with ease even the toughest jobs, and to take care of the variable maximum and minimum load, automatically, 24 hours a day!

Long-life mechanical features contribute to this performance: complete water cooling... mechanical intake valves... vertical piston travel and horizontal valve action... sturdy support for cylinder head... and forced feed lubrication.

Schramm provides heavy-duty, continuous operation with least attention, upkeep and operating costs. Match the speed of modern engines with this compressor.

For further details write for catalog 42-PA.

SCHRAMM INC. THE COMPRESSOR PEOPLE WEST CHESTER PENNSYLVANIA

The Model H-6 Barco gasoline-engine-driven hammer serves to drive sheeting, for rock drilling or pavement breaking.

Gas-Engine Powered Portable Jack Drills

The portable gas-engine-driven Barco hammer which with its battery can be taken anywhere for rock drilling or other similar jackhammer work, has been used for many years in civilian construction and is now in military service.

The Barco hammer is a single-acting two-cycle engine with a free-running piston which is propelled downward by the explosion of a gasoline charge in the combustion chamber and returned by spring action. The piston acts as the hammer, striking an anvil which transmits the blow to the tool which may be a tamper, asphalt cutter, drill, frost wedge, clay spade, chisel, moil point, or sheeting driver.

The piston is always at the upper end of the cylinder when idle and the hammer is started by pushing down on the starting plunger on top of the cylinder. The suction caused by the up stroke admits air and gasoline through the mixing valve into the chamber below the piston. A second down push of the starting plunger compresses this gas which passes through holes in the piston and through the by-pass into the upper combustion chamber. An SP cam on the piston operates the circuit breaker for igniting the gas at the proper time and the two-cycle principle is repeated with the operation of the hammer.

All models use low-test or regular gasoline and lubrication is obtained by mixing oil with the gasoline. The normal fuel consumption of the heavy-duty Model H-6 is one quart of this mixture per operating hour. The gasoline tank attached to the hammer has a capacity of two quarts. Electrical energy is supplied from a coil and battery, and a storage battery is recommended whenever recharging facilities are available. Standard 6-volt storage batteries are used, preferably of not less than 110-ampere-hour rating, at the 20-hour rate. When circumstances require it, a 9-volt dry battery may be substituted. Regular equipment for all models includes a battery carry-frame, coil container and coil, and 25 feet of cable from the hammer to the battery.

Complete information and illustrations showing accessories, such as an exhaust blower for cleaning holes in rock, will be found in the Barco illustrated catalogs 605 and 606 which will be sent promptly by the Barco Mfg. Co., 1801 Winnemac Ave., Chicago, Ill., to those mentioning this item.

Let's add to the four freedoms—freedom from accidents.

New Compound Lays The Dust at Airports

A new compound for controlling dust at airports has been developed by The Curran Corp., Dowling Bldg., Malden, Mass. This newly developed composition is described as a stable homogeneous liquid of relatively low viscosity which may be diluted or extended with water in all proportions. The concentrate and its emulsions are said to be effective in wetting and penetrating over all types of soil, including moist earth. According to the company's Research Director, the new compound may be actually applied to a soft muddy surface immediately following a rain.

Due to the new type of emulsifier used, the new oil will wet only the top 2 inches of soil since it becomes insoluble on further penetration. Because of this property, the composition is not dissolved and leached away into the soil by a following heavy rain. The compound is also reported to be safe and easy to handle, is non-corrosive to metal and spray equipment, and contains an effective weed killer.

Further information on this dust layer and its uses at airfields may be secured by those interested direct from the producer by referring to this descriptive text.

Maintenance Manual Aids In Care of Electric Tools

The important question of wartime maintenance of electric tools is stressed in the new Skilsaw catalog and manual "How to Get the Most From Your Portable Electric Tools". Designed as a handy guide to longer tool life, this new catalog has a special section devoted to tool care and operation, with many photographs illustrating the various methods of prolonging the life of electric tools. The remainder of the catalog, also illustrated, carries complete information on the Skilsaw line.

Free copies of this catalog may be secured by writing to Skilsaw, Inc., 5033-34 Elston Ave., Chicago 30, Ill.

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Speed construction. Protect vital materials in all sorts of weather. FULTON TARPAULINS will give you maximum satisfaction. Contractors Supply Dealers in every state sell the FULTON line. Specify SHUREDRY and FULTEX. FULTON products are good and prices are right. If your dealer can't supply you, write our nearest plant for catalog, samples and prices.

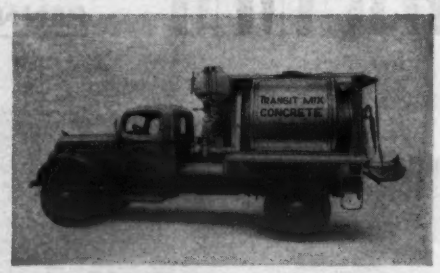
Fulton Bag & Cotton Mills

Ransome PAVERS

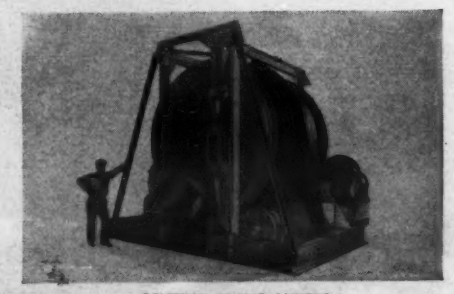
. . . set the pace on airport runway construction

34E DUAL DRUM PAVER ON AIRPORT CONSTRUCTION WORK

PORTABLE MIXERS



HORIZONTAL AND HI-UP TRUCK MIXERS



CENTRAL PLANT MIXERS

During the early days of the war, Army and Navy training programs called for the construction of a great many large airports . . . in the shortest possible time. Ransome Pavers went to work laying runways and hangar aprons.

These big machines, producing up to 12½ cubic yards per hour with a one minute mixing time, stayed on the job as long as twenty-four hours a day, seven days a week. New production records were hung up—airports were finished far ahead of schedule.

Ransome 34-E Dual Drum Pavers have many features making for efficient operation and trouble-free performance. Write for literature.

RANSOME MACHINERY COMPANY

DUNELLEN N. J. - U. S. A.

SUBSIDIARY OF WORTHINGTON PUMP AND MACHINERY CORPORATION

Winter Maintenance To Check Ice Hazard

Use of Abrasive Materials With Chlorides for Full Treatment Increases the Safety of Motor Traffic

✦ TO make highways safe for winter traffic in our northern states, the traveled way must be plowed as clear of snow as possible and the ice forming on the pavement must be treated with an abrasive material, either with or without calcium or sodium chloride. Some states have secured satisfactory results with the chloride alone without abrasives.

The extent of treatment in intensity and miles depends on the character of the storm, grades, intersections, curves, and the character and volume of traffic. Treatment must continue as long as a hazardous condition exists, and if the abrasive is whipped off by high-speed traffic it must be replaced. Any relaxing of this service inevitably results in accidents and obviously is false economy.

Types of Abrasives

The Sub-Committee on Recommended Practice for Treatment of Icy Pavements, comprised of J. E. Lawrence, Maintenance Engineer, Massachusetts Department of Public Works, Norman Hill, Maintenance Engineer, Washington State Highway Department, and B. R. Downey, Maintenance Engineer, Michigan State Highway Department, in its report to the Twenty-Third Annual Meeting of the Highway Research Board in Chicago, Ill., stated:

"Local availability and unit costs will control the type of abrasive to be used. . . . The cost of labor and equipment for storing and applying abrasives is several times the cost of the material itself. Thus a small initial saving in material cost might be more than offset by the necessity for larger quantities of abrasives per square yard or more frequent applications. In considering the type of abrasive to be used, careful thought should be given to the selection of a material which will have the least deleterious effect on rubber tires.

"*Sand*—The requirements for sand for ice control differ from those for concrete or general-purpose sand in that the desirable feature of ice-treatment sand is uniform size, whereas a concrete sand should be well graded. Ice-treatment sand should not contain fines or coarse material, as sand containing fine material does not provide good traction and increases slipperiness, and coarse material is likely to whip off and create a skid hazard. Sand for ice control should be clean, hard, sharp, and free from loam, clay, or frozen lumps, with 100 per cent passing a ⅜-inch sieve, not less than 65 per cent passing a No. 16 sieve, and not more than 25 per cent passing a No. 50 sieve. This sand will provide good traction and will have very little grinding effect on the road surface.

"*Cinders*—Cinders are sharper than sand and cling to tires and cut into ice better than rounded sand particles. The melting or embedding action of cinders with their greater porosity is better than that of sand because of the larger quantity of moisture and chloride held at or near the surface of the cinder particles. Due to their dark color, cinders absorb more heat than sand when the sun is shining, which results in greater embedment. Also, cinders have less tendency to clog drainage structures.

"*Washed Stone Dust*—Some stone quarries produce a stone dust from which the fines are removed by washing. This treatment produces a good abrasive. A satisfactory grading specification for a stone dust abrasive follows:

GRADING REQUIREMENTS FOR STONE DUST ABRASIVE FOR ICE CONTROL

Size of Sieve	Percentage of Weight Passing	
	Minimum	Maximum
⅜-inch	—	100
No. 4	95	100
No. 16	55	80
No. 50	10	25

"Stone shall have a percentage of wear as determined by the Los Angeles Abrasion Test (AASHO Standard Method T-96-38) of not more than 35 per cent.

"*Other Types*—Other abrasives such as pea gravel, slag screenings, and sawdust may be used as substitutes for the more desirable sand or cinders. However, these materials are more difficult to treat with chlorides and consequently are harder to handle from a stockpile during cold weather. These other materials have a greater tendency to clog drainage systems and culverts."

The chlorides used with abrasives, either dry or in solution, are calcium and sodium chloride which should conform to the ASTM Standard Specifications D98 and D632 respectively.

Dry Chlorides with Abrasives

To prevent abrasives freezing during storage and to cause a slight immediate melting of the surface of the ice to embed the abrasive, dry sodium or calcium chloride is usually added. In stockpiling abrasives, from 40 to 75 pounds of chloride is added per cubic yard, depending on the anticipated temperature

(*Continued on page 62*)

F24
LANSING
Wheelbarrows

are being used around the world and most of them are going to the Army and Navy. They can still be sold to civilians who can qualify under Limitation Order M-126.

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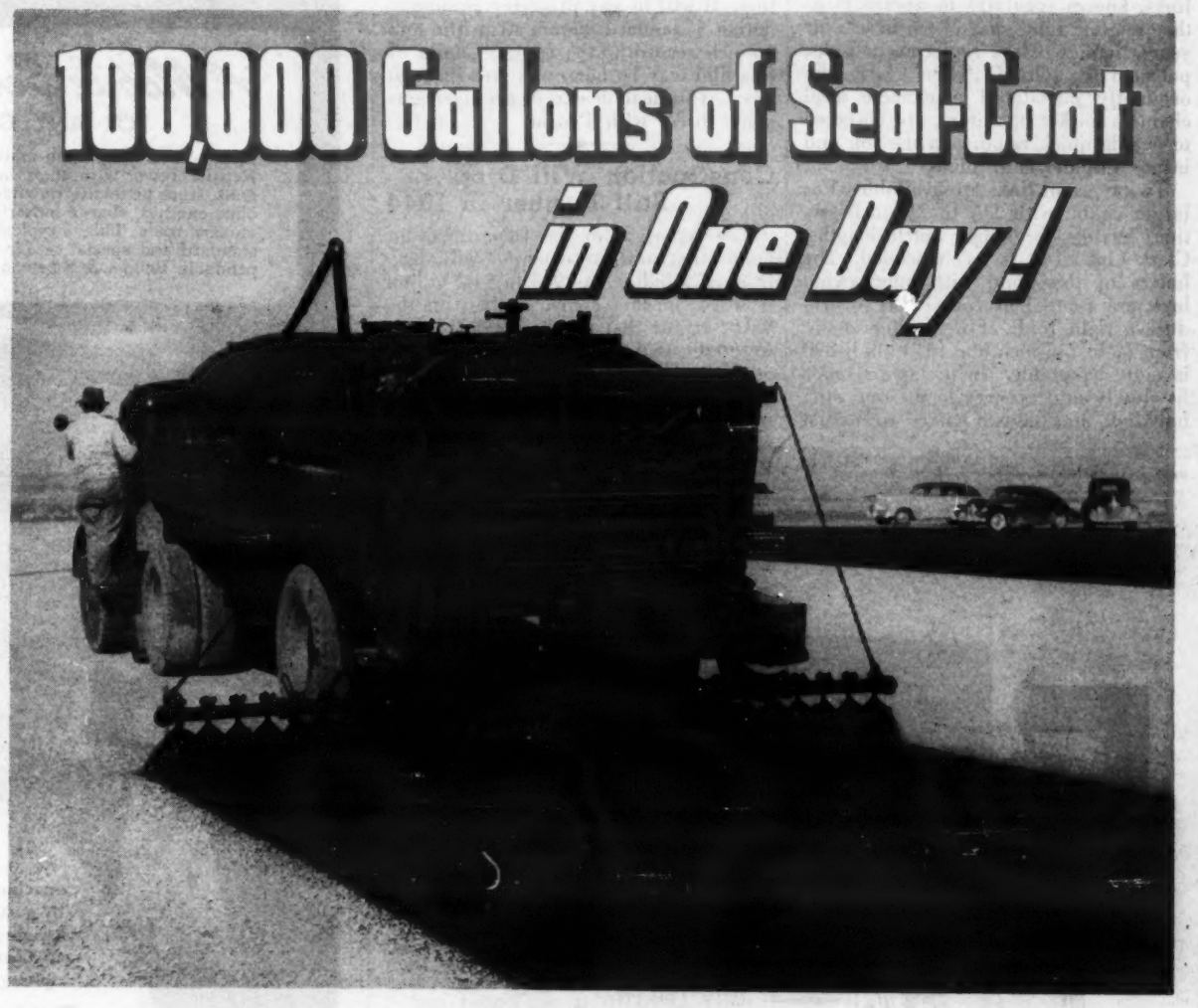
100,000 Gallons of Seal-Coat in One Day!



On an air base in the Pacific Northwest, Morrison-Knudsen Company, Inc., and Tri-Angle Construction Company applied approximately one million gallons of MC-2 prime and RC-2 seal coat. As much as ten carloads were applied on one single day.

This amazing performance was done with a Standard Steel Works 2000-gallon Model 400 asphalt distributor and could have been accomplished each day had the grade been ready for the prime and the weather not interfered.

This distributor was equipped with a 12-foot air operated full circulating spray bar, a 350 G.P.M. special asphalt pump, and a Ford V-8, 85 horsepower engine with two speed transmission. Four to six supply tanks of from 2000 to 5000 gallons capacity were used to keep it busy. Check today with the nearest dealer below.

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EMULSION SPRAY UNITS
MAINTENANCE DISTRIBUTORS
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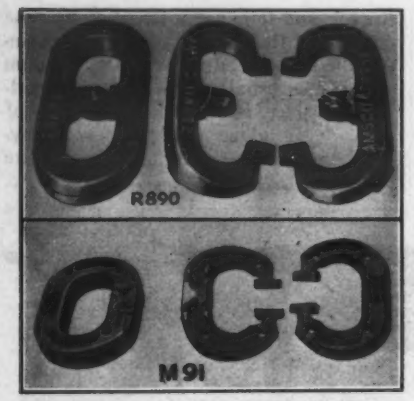
Standard Steel Works
NORTH KANSAS CITY, MISSOURI



The two types of recently developed replacement links to repair and extend the service life of dragline bucket chain.

New "Missing Link" Repairs Bucket Chain

A contribution to the service life and performance of dragline bucket chain has been made by the development of a new repair link to replace worn-out or broken links. Although closing or repair links, known jocularly to operators as the "missing link", have been in use for years, the new Clark replacement links, patented by John O'Fallon Clark who originally introduced manganese steel chain to bucket operators, are designed to enable quick repairs on the job and insure a tightly held joint.

Two types of links are available. For larger chain, with 1¼ to 2½-inch section, having the longer pitch lengths, Clark Link M-91 is recommended. The halves of this link, with interlocking lugs, are secured by four rivets to produce a tight joint. For smaller chain, from ⅞ to 1⅛-inch, the J-C Link R-890 is more adaptable. In it, tapered ends fit closely into grooves in the opposing half link, and the two halves are joined together by a single rivet through the joined center lugs. The center bar or stud prevents the kinking that might lead to destructive jerks in operating.

Further information on these replacement links may be secured direct from the American Manganese Steel Division, American Brake Shoe Co., 398 E. 14th St., Chicago Heights, Ill., which announces that both types of repair links are carried in stock for immediate shipment.

A New Sound Movie On Safe Earth Moving

A sound motion picture dedicated to safe practices in the operation of earth-moving machinery has been prepared and made available for free borrowing by R. G. LeTourneau, Inc., of Peoria, Ill. This film "Safe Earthmoving" presents a pictorial story of possible earth-moving hazards and demonstrates the proper way of doing the job, with insert cartoons showing amusing yet serious mishaps.

The running time for this strip film is 13 minutes, including music and narration. It will fit any projector accommodating a standard 35-mm strip film and 16-inch record (33⅓ rpm). Copies of this film may be borrowed free through any LeTourneau dealer, or arrangements made direct with Peoria.

Construction Will Drop Still Further in 1944

The report from the Department of Labor that new construction will drop from $7.4 billion in 1943 to $4.2 billion in 1944 appears concurrently with the WMC report that another 500,000 men were released from construction for other employment by the end of 1943.

The Secretary of Labor reports, "Construction for private account will decline from an estimated $1.6 billion in 1943 to $1.3 billion in 1944. Public construction expenditures for 1944 are forecast at $2.9 billion as compared with a preliminary estimate of $5.7 billion in 1943."

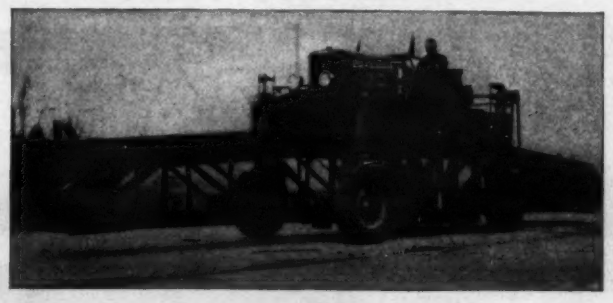
Ohio Selects Mulch With Eye on the War

The Ohio Department of Highways has curtailed its seeding and mulching activities for the duration to essential erosion-control work on vital war-transportation and access highways. But even in the selection of the mulch on these important projects, every effort is made to avoid conflict with essential war needs.

For mulching newly seeded areas along highways, straw is generally used. This may be wheat or oat straw and is of a grade and quality not ordinarily suitable for paper or paper-box manufacture. The Department is cooperating with manufacturers of paper and paper boxes in this matter, and has been working with them in state-wide publicity campaigns to induce the farmers to salvage more straw following their harvesting seasons.

Also a considerable quantity of the stems of clover, alfalfa, timothy and soy beans is used for mulching. These stems are refuse from seed harvesting and are unsuitable for any other purpose. The farmers formerly burned them. Hay is sometimes used for mulching purposes, but when it is, the hay is selected because it is moldy, has stood in stacks until it has weathered and darkened, or otherwise become unfit for stock feeding.

Mulching is very important in seeding operations. It protects the seed, assists in germination and promotes a quick stand of vegetation, while seeding without mulching has proved to be not more than 15 per cent efficient, by comparison. The importance of erosion control in the maintenance of highways is fully recognized, but even in this important activity, the Ohio Department of Highways is doing its best to adapt its operations so that no material is used which could be put to more vital use in the war effort.



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Hyster Straddle Trucks are built to handle up to 30,000 lb. loads (a small carload). Any type of material, ANY LENGTH, is self-loaded and self-unloaded in less than two seconds, in perfect condition, exactly where desired.

HIGH PILING

HYSTER

FLEXIBLE TRANSPORTATION AND STORAGE

Transporting, Loading, Unloading

HYSTER LIFT TRUCKS can high stack materials 25 feet high, conserving ground storage space and shortening hauls. Capacities up to 15,000 lb. loads and down to 2,000 lb. loads to fill every need.

HYSTER LIFT TRUCKS and KARRY KRANES are also used to load and unload trucks, cars, cargo planes and ships.

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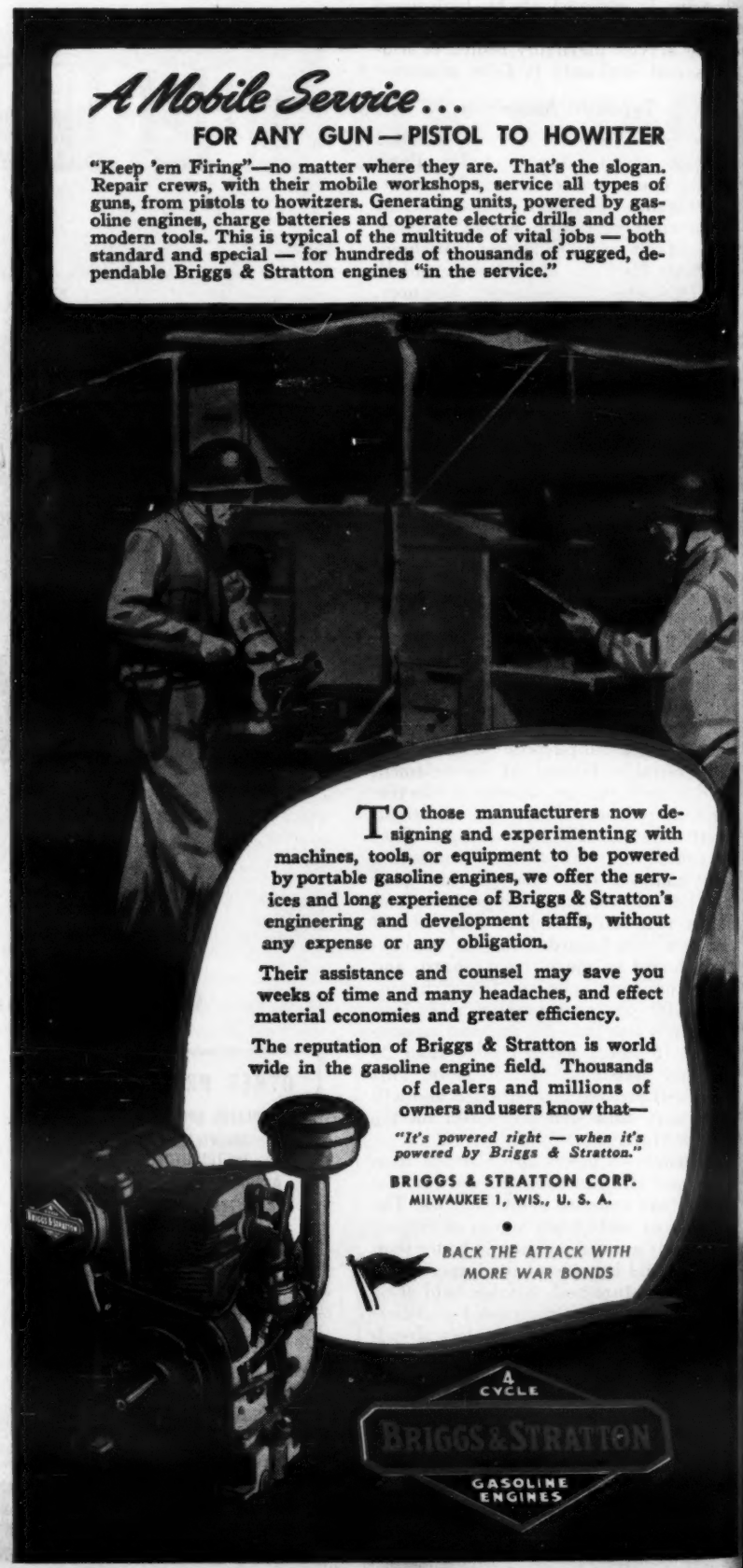
"Keep 'em Firing"—no matter where they are. That's the slogan. Repair crews, with their mobile workshops, service all types of guns, from pistols to howitzers. Generating units, powered by gasoline engines, charge batteries and operate electric drills and other modern tools. This is typical of the multitude of vital jobs — both standard and special — for hundreds of thousands of rugged, dependable Briggs & Stratton engines "in the service."



TO those manufacturers now designing and experimenting with machines, tools, or equipment to be powered by portable gasoline engines, we offer the services and long experience of Briggs & Stratton's engineering and development staffs, without any expense or any obligation.

Their assistance and counsel may save you weeks of time and many headaches, and effect material economies and greater efficiency.

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BACK THE ATTACK WITH MORE WAR BONDS

4 CYCLE BRIGGS & STRATTON GASOLINE ENGINES

Methods of Erection Of Navy LTA Hangar

(*Continued from page 7*)

ricks and the connections completed. The method was so successful and the operation so well organized that, on one hangar, the fifty-one trusses were erected in thirty-five days.

Tongue-and-groove fire-treated lumber 2 inches thick was used for roof sheathing and was covered with roll roofing felt.

Box-Girder Guides for End Doors

At the ends of the hangar four concrete pylons 147 feet high were constructed to support the wooden box girders housing the door-operating mechanism and the guides for the rolling doors.

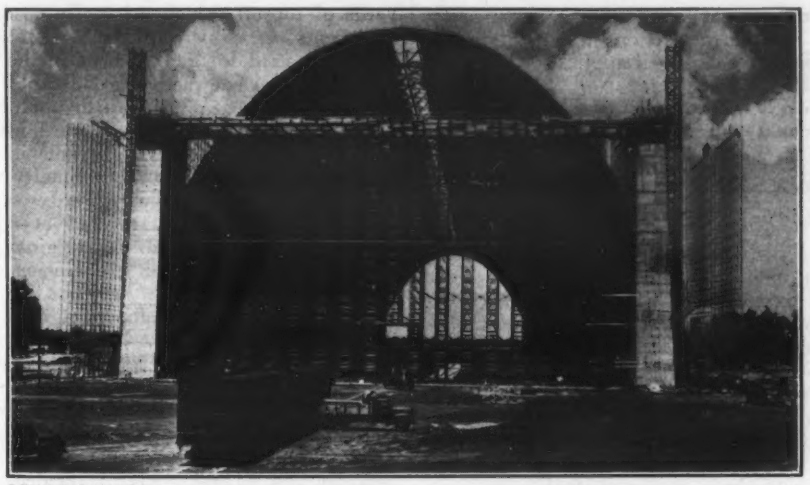
These box girders, 21 feet 9½ inches square and 303 feet 7 inches long, were constructed of timber with corner reinforcement of steel angles, 8 x 8 x ½ inches on the inside and ½-inch steel plates, 27 inches wide and bent to a right angle, on the outside. The girder ribs are 3 x 6 and 3 x 12-inch lumber, set in pairs at a spacing of 7 feet 1 inch. The sides, bottom and tops of the girders are 3 x 12-inch planks, bolted to the ribs with ½-inch bolts. The top of the box girders are covered with roll roofing felt and the sides, with asbestos board. Guides for the rolling doors are attached to the exterior bottoms of the box girders. These guides are T-shaped pieces of steel formed by welding 1 x 10-inch plates at right angles to ¾ x 10-inch plates attached to the bottoms of the box girders. These serve merely as guides for the tops of the rolling doors and do not support any of their weight.

The box girders were erected in their final position on nineteen temporary columns of Safway steel scaffolding. Each of these columns was approximately 6 feet x 40 feet in plan and 120 feet high, all cross-braced to form a substantial support for the personnel engaged in erecting the box girders and the materials entering into their construction. Two Novo 2-drum hoists, one Allis-Chalmers double-drum hoist, and one single-drum Jaeger Hoister were busily engaged at the time of our visit to the project in raising materials for the construction going forward on one of the box girders, and an Ingersoll-Rand 210-cubic-foot compressor was delivering air to the air drills and wrenches above.

The end doors, designed, fabricated and erected by Byrne Doors, Inc., of Detroit, consist of six movable sections at each end of the hangar. Each section is an asbestos-board-covered steel framework approximately 37 feet long, 5 feet thick, and 120 feet high. Each door section is supported by two flanged wheels which run on steel rails set flush with the concrete floor. Each of the three rails serves as a support for two door sections which move in opposite directions when the end doors are opened or closed.

The overhead box girders spanning the distance between the concrete pylons and extending approximately 29 feet beyond them on each end serve to guide the movement of the tops of the door sections and to house the cleverly arranged door-operating cables. These cables and their controls are so arranged that the two outside sections, forming the center of the closed doors, move the fastest, the next two sections move at a reduced speed, and the sections which form the portions of the doors closest to the side walls of the hangar move at a still lower speed. By this arrangement, all six sections of door, moving at varying rates of speed, arrive at their fully opened or fully closed positions at the same instant.

The door sections, before the application of the asbestos-board covering, were set in their upright position on the door tracks by a Marion crane equipped with a 95-foot boom.



Official U. S. Navy Photo

Steel-tubing scaffolds for erection of the box girder at the end of the hangar.

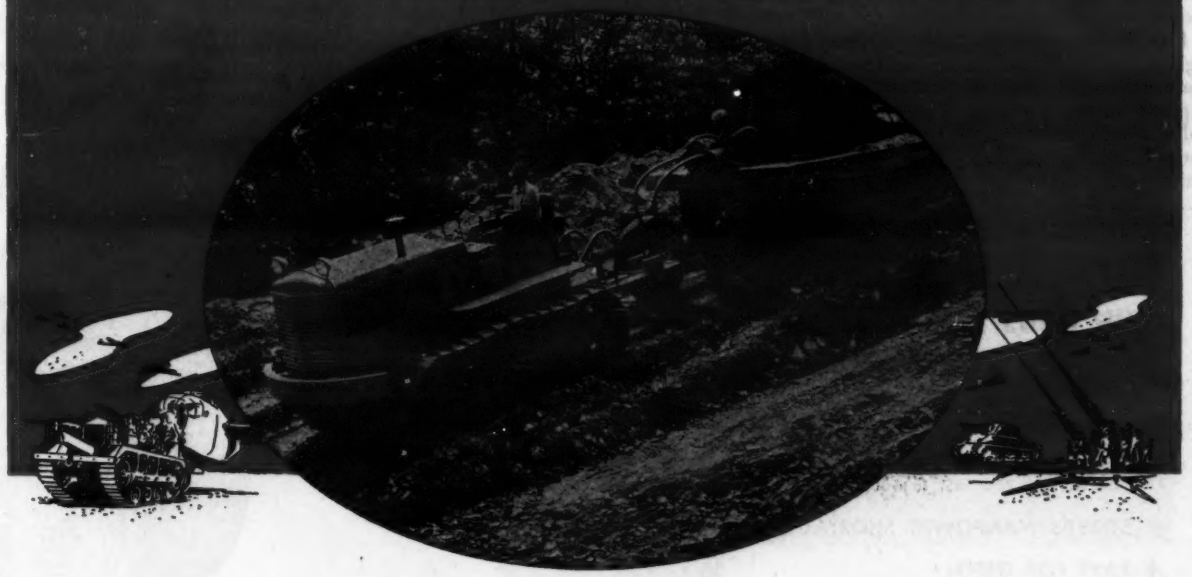
Personnel

These hangars were erected under a cost-plus-a-fixed-fee contract by W. C. Shepherd and Griffin Construction Co. of Atlanta, Ga. The project was under the personal direction of Lieutenant-Commander L. G. Lloyd (CEC) USNR, Officer in Charge of Construction, and Lieutenant T. C. Barnett (CEC) USNR, for the United States Navy. C. R. Justi was Superintendent for the contractor.

The road program after the war is not a mere employment program—it is a "must" to keep our highway transportation system going.—*Thomas H. MacDonald, Commissioner, Public Roads Administration.*

The experiences of war have proven the value of

Cletrac Tru-Traction



EVERY high-speed crawler vehicle used by the armed forces has employed controlled, differential steering. This means the ability to steer with the tractor under control at all times because of power on both tracks at all times. Controlled differential steering is an operating feature *exclusive* with Cletrac. We call it *Tru-Traction.*

It is used on practically all military crawler type equipment.

With Tru-Traction, you have power that is dependable in getting through tough spots without stalling or miring down. Power that can be used when turning at high speeds without jack knifing. Power that will do your jobs better—and put more money in your pocket.

Only Cletrac has Tru-Traction.

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Dependable Products Since 1873

LOCKLAND, CINCINNATI, OHIO

The new regular-pattern Gar-Bro combination shackle and thimble.

New Wire-Rope Fitting For Regular Service

To supplement the Gar-Bro heavy-pattern combination shackle and thimble, known as the Gar-Bro Shimble, for extra-heavy-duty work, Garlinghouse Brothers, 2416 E. 16th St., Los Angeles 21, Calif., has announced a regular-pattern Shimble for average sling service. This pattern is available in two styles: the regular-pattern Standard (the equivalent of a standard shackle) and the regular-pattern Style A (regular socket equivalent), which is designed to provide for the safe strength of rope as widely used in general materials-handling by sling. Both may be had in a full range of rope sizes from ⅛ to 1⅝-inch.

Like the heavy-pattern Shimbles, these lighter Gar-Bro Shimbles are hot-forged from mild-steel bars to provide rigid support for the wire rope in correct non-collapsible contour, and to give improved rope protection. All Gar-Bro Shimbles are either painted or galvanized.

Further details on these two types of Shimbles and their applications are contained in Bulletin No. 72, copies of which may be secured direct from the manufacturer by mentioning this item.

Roadside-Item Cuts Are False Savings

A serious economic loss has resulted in many states through the removal of erosion-control items from regular highway construction contracts as an alleged wartime economy measure. Because of cuts in sod quantities, elimination of the 1 per cent Roadside Improvement Fund, and other slashes, many completed contracts have actually left the highway unfinished. Failure to include these erosion-control items as a part of the construction contracts permits erosion to start on many slopes and reach a point where the already depleted funds and man-power of the Maintenance Department cannot cope with the situation. This has led, of necessity, to the letting of small erosion-control contracts.

An analysis of one of seven such contracts let by a midwest state highway department reveals something of the added expense incurred by incomplete design and construction. Three factors contributed to the high replacement costs of the supplementary contract required by the omission of the erosion-control items from the original contract: 1. The small quantities involved necessarily required higher unit prices; 2. The complete loss of the eroded soil, which had to be replaced by long hauls instead of from stockpiles; 3. The differential in costs from 1941 to 1943.

The loss by erosion of 2,000 cubic yards of topsoil, which originally cost 27.6 cents per cubic yard, cost $1.225 per cubic yard for replacement in the erosion-control contract. An additional 9,489 square yards of sod, which would have cost 18 cents per square yard in the highway contract, cost 28 cents in the smaller control contract. Finally, an additional 85,922 square yards of mulched seeding which was bid at 3 cents per square yard in the original contract cost 7.6 cents in the erosion-control contract.

The extras, or cost-above-original-bids, thus were:

Borrow, topsoil	$2,450.00
Sodding	948.90
Mulched seeding	3,952.41
Increase over original costs	$7,351.31

Since the total of the erosion-control contract was $11,636.99, it is evident that the expenditure of $4,285.68 during the original contract would have saved $7,351.31, and this increase, which in reality was cut from the original highway contract, amounted to only 2 per cent of that contract. In addition to the monetary loss, there was the additional loss of one year's growing and stabilization time.

New Lenses for Welders

Noviweld-Didymium lenses for flame welders are now available in four shades, Nos. 3, 4, 5 and 6, with the addition of the new light No. 3 shade, according to an announcement by the American Optical Co., Southbridge, Mass. This company states that lenses made from this glass absorb sodium flare, thus enabling flame welders to see working areas more clearly. In addition, the glass protects the eyes against both ultra-violet and infra-red radiation. Ground and polished to ophthalmic standards, the lenses preserve orange and red color value so that welders can see the red-hot bead and the molten metal in brilliant colors.

Complete information on these lenses may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

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now does the WORK of THREE!
with ANTHONY HYDRAULIC TAILGATE LOADER!

CAPACITIES 750 LBS. to 1500 LBS.

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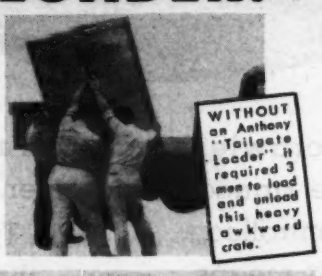

With an Anthony "Tailgate Loader" one man easily places heavy awkward crate on tailgate. . . .

. . . by hydraulic lift, controlled by one lever, one man raises heavy, awkward crate to floor level. . . .

Tailgate automatically stops flush with body floor, permitting one man to easily and safely load heavy, awkward crate.

• SAVES MANPOWER! One man now does what three or more formerly did.
• CUTS LOADING AND UNLOADING TIME! Trucks are loaded and unloaded faster — keeps them on the move.
• REDUCES PERSONNEL ACCIDENTS! Loads are lifted to body or lowered to ground by powerful hydraulic hoist mechanism controlled by one convenient lever.
• REDUCES ACCIDENTAL DAMAGE TO VALUABLE MERCHANDISE! No skids, chains or cables to break or slip. Minimizes your damage losses.

Anthony "ZB" Hydraulic Platform Hoist makes inexpensive dump body out of platform, stake and grain bodies.

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• Under tomorrow's competition, the hours and dollars you can save with a Carver *Certified* Centrifugal for supplying water or dewatering excavations will be an important item.

When the time comes to sharpen your pencil for close bidding on that big airport job, remember CARVER . . . the battle-proved construction pump that takes mud, sand or grit in its stride, that *stays* on the job longer to *move* water at *less* cost!

Get the facts from your nearby CARVER distributor, or write us *now* for your copy of the new CARVER catalog.

THE CARVER PUMP CO.
Muscatine, Iowa

CARVER CENTRIFUGAL
Certified

New Traffic Facilities Built in Pittsburgh

Duquesne Way Takes Trucks Off City Streets, Serves Wharf and Warehouse Areas; Built by County of Allegheny

(*Photos on page* 80)

✦ A MAJOR construction project costing about $2,000,000 was opened for partial traffic on Friday, August 13, 1943, in the City of Pittsburgh, Pa. Only 4,200 feet in length, this new traffic facility, Duquesne Way, was planned and financed almost wholly by the County of Allegheny as a portion of a project for surrounding the downtown business district with a high-speed traffic belt connected to main arteries. Incidentally, it is a major contribution to the solution of the heavy trucking problem along the Allegheny River between the Pennsylvania Railroad warehouse district and The Point, where the Monongahela and Allegheny Rivers unite to form the Ohio River. This improvement includes a throughway with no cross traffic, (a four-lane roadway and wide wharf area), passing under three bridges, at Sixth, Seventh, and Ninth Streets, and accessible only by ramps at each end.

The construction is on an old wharfage area protected by cobbles, owned by the city and lying between existing Duquesne Way and the Allegheny River. The lower roadway is on a granulated-slag fill and is surfaced with a 10-inch unreinforced-concrete pavement, flanked on the water side by a flat wharf area with a concrete retaining wall to which river boats and barges can be moored, and on the shore side by an inner wall rising 20 feet above the wharf and lower roadway area, which supports the downstream-bound upper roadway.

Lower Roadway

The lower roadway is divided into two east-bound (upstream) and two west-bound lanes, and is set off from the wharf area by a wooden barrier, which is removable in time of floods or for access to the wharf area. The 10-inch unreinforced-concrete slab of the roadway and wharf area will carry the heaviest axle-load traffic, which is 18,000 pounds per axle, or 26,000 pounds per four-wheel vehicle, according to Pennsylvania law. The wharf and lower roadway are about 5 feet above normal pool elevation in the Allegheny River and will be flooded at times. Flush hydrants are placed beneath covers along the wharf area for fighting fires in barges, and can also be used for flushing the lower roadway and wharf area to clean off the silt after floods. Although built by the County of Allegheny, Duquesne Way will be maintained by the City of Pittsburgh.

The Demountable Barriers

The wood dividing guard between the wharf area and the lower roadway is a novel conception. A truck coming down the roadway can be driven on to the wharf area by merely removing two adjacent lengths of the guard, which is an oak timber, 8 x 8 inches in section and 8 feet long, held 10 inches above the pavement by a 10 x 8-inch block and a pair of dowels in a pipe sleeve in the pavement.

A separate block of concrete 2 feet deep, 15 inches wide, and 3 feet 7 inches long is cast in the 10-inch concrete slab to support the wooden dividing barrier. In this are two 1½-inch-diameter wrought-iron pipes running the whole depth of the block of concrete to permit drainage into a pocket of stone beneath the concrete block and thence into the granulated-slag fill. The bolts or dowels holding the oak timbers in place have a ring in the top for ease in lifting them and a collar 18 inches from the top to limit the distance which the dowel goes into the pipe. These dowels are 23 inches long, while the socket or pipe in the concrete block is 24 inches long.

In order to produce the oak timbers for this demountable guard, the contractor set up a saw rig with guides so that the timber was cut square almost automatically when it was set in the jig. The

(*Concluded on page* 38)

Duquesne Way under construction, showing the upper westbound roadway, inner wall, river boulevard, wharf area, and traffic separation ramp.

Prepare for Post-War Profits

WITH AUSTIN-WESTERN CRUSHING EQUIPMENT

4022 Roll Crusher — 2540 Primary Breaker

PORTABLE PLANTS

● Austin-Western portable Crushing and Screening Plants range in size and capacity from the magnificent Twin-Unit Plant, illustrated above, to the simple C.E.P. Plant, illustrated at the left.

The Twin-Unit Plant combines maximum output with the flexibility and portability that result from building it in two Units, Primary and Secondary. C.E.P. (Crusher, Elevator, Power) Plants can be had with any size Austin-Western crusher; can be used alone, or incorporated into more elaborate Plants.

The Austin-Western line also includes conveyors, screens and bins, all of which can be combined with crushers to produce practically any desired size and style of portable, semi-portable or stationary Crushing and Screening Plant.

JAW and ROLL CRUSHERS

● The 2540 Primary Breaker, illustrated at the left, is used for the preliminary breaking of large stone down to a size that can be handled by the balance of the equipment.

General Purpose Crushers are made in several sizes and can be used in either quarries or gravel pits.

Roll Crushers are designed to take the stone, after it has had its preliminary breaking, and reduce it to the smaller sizes of aggregate, now so generally required.

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Road-Mixed Runway For New Flight Strip

(*Continued from page* 15)

of sand. The asphalt was hauled in from a siding 2 miles away by four 600-gallon feeder trucks. A Wood traveling mixer was used for the road-mixing operation with a 600-gallon tank mounted on the frame. The stabilized material was mixed in strips, 7½ feet wide and to a depth giving an 8-inch compacted thickness, by the Wood machine, which progressed at a uniform rate of 17 feet per minute, with an asphalt feeder truck running alongside feeding 4 gallons of RC-1 per square yard to the mixer.

The mixer worked strips 2,400 feet long before turning at one end, and 1,600 feet long at the other, adding greatly to the efficiency of the mixing operation. The contractor waited until about 60 feet in width had been mixed before beginning aeration with harrows and a pulled grader hauled by crawler tractors. When the mixed material had been fully aerated, it was laid flat to grade with a longitudinal grade of 4 feet in 2,000 feet both ways from the mid point of the Flight Strip. If a section had not been fully aerated by the close of the day's work, it was laid flat and to grade to permit it to drain in case of rain during the night.

The 9-inch loose mix was compacted by sheepsfoot rollers, followed by a blade to fill the holes of the roller, to within 1½ inches of the top surface. The top loose material was bladed to finish grade and rolled by pneumatic-tire rollers and an 8-ton tandem roller.

An enriched top layer 2 inches in thickness was produced by harrowing the top 2 inches of the compacted top road-mixed layer, applying 0.2 gallon of RC-1 per square yard and compacting by the pneumatic and tandem rollers for a period of 36 hours.

Shoulder and Slope Treatment

The entire stabilized area outside of the 4,000 x 150-foot runway was covered with a 2-inch blanket of organic muck, which was mixed with the stabilized material to aid in speedily establishing a healthy growth of grass. On the graded area a 4-inch silt blanket was mixed with 4 inches of sandy soil for 1,000 feet beyond the stabilized area off the ends of the runway, for 25 feet outside the stabilized shoulders along the runway, and to the top of the backslope of the drainage ditch, which is 60 feet further out from the paved section. The first 25 feet has a slope of 1½ per cent, then the ditch slope is 10 to 1 covered also with 4 inches of organic muck, no muck in the ditch bottom, and then the 4-to-1 backslope also has the 4 inches of muck.

The entire area outside the paved runway was sprigged except for the bottom of the ditch. A cattle guard has been built where the access road enters the Flight Strip to prevent cattle, which wander in open range in this section, from getting onto the runway. The entire area is enclosed by a wooden fence.

Access Road and Drainage

The access road is 22 feet wide and 5,424 feet in length, leading from the main highway. It is a 6-inch road-mixed roadway on an 18-inch stabilized base worked in two equal layers of 30-pound bearing. The shoulders and slopes were covered with a 4-inch muck blanket and grassed.

The Flight-Strip area is adequately drained by the very character of the sandy soil itself, which does not hold water. Ditches running parallel to the runway provide the only means of carrying water from the Flight-Strip area. A culvert 10 x 2 feet and 44 feet in length permits drainage in the ditch to pass under the access roadway, and a pair of 24-inch reinforced-concrete culvert pipes 54 feet long are installed at Station 241 of the access road and the main highway.

C. & E. M. Photo

The low wide culvert under the access roadway to a southern Flight Strip carries all drainage from one side of the asphalt runway.

Major Quantities

The major quantities involved in the construction of this Flight Strip, which was built at a contract cost of $538,706-.47, were as follows:

Clearing and grubbing	146.88	acres
Excavation, grading	305,806	cu. yds.
Excavation, stabilizing material	62,185	cu. yds.
Excavation, ditch, lateral	3,963	cu. yds.
Excavation, muck on field	55,916	cu. yds.
(This figure actually ran up to	80,000	cu. yds.)
Overhaul, ½-mile cu. yds.	15,219	½-m. cu. yds.
(Free haul was 3,000 ft.)		
Mixing and compacting 18 inches of stabilization	313,252	sq. yds.
Muck blanket, 2-inch	230,961	sq. yds.
Muck blanket, 4-inch	286,124	sq. yds.
Sand-bituminous road-mix, 6-inch for access road	13,524	sq. yds.
Sand-bituminous road-mix, 8-inch for runway	68,768	sq. yds.
Bituminous material, RC-1	473,466	gals.
Sprigging	498,810	sq. yds.
Wood fence	18,000	lin. ft.
Overhaul, stabilizing material, ½-mile cu. yds. (Free haul 1 mile)	488,546	½-m. cu. yds.

Personnel

The Flight Strip described was constructed by the state highway department under the supervision of the Public Roads Administration. For the state the work was in charge of F. G. McDaniel, Project Engineer. The contractor was Hooper Construction Co., for whom J. E. Stanton was Superintendent.

Marion President Dies

D. J. Shelton, President of The Marion Steam Shovel Co., Marion, Ohio, died on November 27 after a very brief illness. Mr. Shelton, known as "Doc" to his friends and business associates, had been connected with the company since 1909, following his graduation from Ohio University, and was elected President and General Manager in 1941. His death is a severe loss to the industry.

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H. WENZEL TENT & DUCK M

ST. LOUIS, MO.

Needed New Airports For Post-War Period

(*Continued from page 2*)

larger airports, for those in many major cities are already overcrowded.

How are we going to obtain the airports we shall certainly need? Should they be provided by the Federal government? Or by the various states? Or by municipalities and other local government units? Or by a combination of all three?

Mr. Stanton believes that the Federal government and state governments should become partners in building the nation's post-war civil airport system, in general accord with principles worked out in building the national highway system. If the President and the Congress authorize a Federal Aid airport, funds appropriated could be apportioned to the states by the CAA upon the basis of some accepted formula. Such a formula, according to Mr. Stanton, should take account of four factors: (1) the area of the state, (2) its population, (3) number of registered aircraft in the state, and (4) the existing number of accredited airports. Under this plan, as in the Federal highway system, each state would have to match a specified percentage of quota of Federal funds.

The total sum appropriated by Congress would presumably be based upon consideration of a national airport system brought up-to-date annually by CAA, and submitted with the appropriation request, and would be sufficient for only a portion of the total program in any one year. It would be wise to give the state aeronautical authorities the responsibility of selecting from the national plan the particular projects to be undertaken within their states out of each year's allotment. It also seems desirable for the same bodies or other state construction agencies, as the states may determine, to carry out actual construction in strict accordance with CAA standards.

Industrial Greases, Their What and Why

There is no single problem which is common to all industries and which is so universal and so fundamentally important as the "grease problem". Failure to keep up with new lubrication developments and methods, and the resulting failure to apply the right grease, in the right place, at the right time and in the right way, causes tremendous loss to industry every year in time, money, materials, motive power and man-power.

A useful booklet entitled "What Makes a Grease" has recently been published by Sun Oil Co., Dept. 50, 1608 Walnut St., Philadelphia 3, Pa. It describes the outstanding characteristics of the various Sun greases that have been developed for different uses, including adhesive pressure grease, gun grease, pressure system grease, roller bearing grease, and others. A copy of this booklet may be secured by writing to that company, and mentioning this review.

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Shoulder Build-Up Checked in Ohio

Dragging Replaces Blading And Hauling Away Excess Material; Saves Reseeding, Stops Repeating Vicious Cycle

By DALLAS D. DUPRE, Landscape Architect, Ohio Department of Highways

✦ SHOULDERS do build up, because of various causes, but experience in Ohio has been that it is much cheaper in the long run, and also better from the traffic-flow standpoint, to have vegetation to the edge of the pavement, providing traffic does not tend to run off too much and cause ruts. It is costly to blade and haul off excess materials, and your troubles begin unless you immediately re-seed. Then if you re-seed and in a year or two blade again, a vicious cycle is started.

We have found in Ohio that shoulder build-up is due generally to two things: (1) winter heaving; (2) dust, dirt, and ice-control grits accumulating in the grass. The usual shoulder does not have sufficient slope to help get rid of this material by heavy rain wash, but most states are gradually correcting this fault.

What can be done about this shoulder build-up?

First of all, we have found in Ohio that a rolling or two with a 1,000-pound steel or concrete roller in the early spring, before the crews can normally get out for spring pavement repair, will put all shoulders down where they belong. This applies to highway sections that do not have the build-up due to the accumulation of outside materials. Where this latter situation applies, we do one of two things: (1) sweep the material out, usually into the too-deep ditches, with rotary sweepers, or (2) blade it out, using a box-type shoulder drag which shaves off the material and the grass tops, but does not disturb the grass roots. This operation is followed by rolling, resulting in good shoulders.

This box drag is used normally for maintaining aggregate shoulders out to the grass line, about 30 inches width of aggregate. On many highways, grass will creep in through the aggregate if it is left alone, so the box drag is not used on these sections, resulting in a stabilizing root development. The labor shortage has proved this long-time contention of mine, although it is true that traffic is less at present, and there is less running off of the pavement. We have found, though, that a good solid base of stone makes a fine base for grass shoulders and it affords a firm auxiliary pavement in an emergency, and the grass mowing and the above-mentioned early spring work are the only upkeep.

The special roller and box-type berm drag used in Ohio in correcting high shoulders at edges of pavements.

The original steel-wheel roller weighted to 1,000 pounds with water for use in this work, is shown in the illustration. It has generally been replaced in other divisions in Ohio by rollers 4 to 5 feet long and 3 feet in diameter, cast of concrete in drain tile. With a pipe axle cast in the center, these rollers are easily pulled by the regular maintenance trucks.

A plan showing the details of both the drag and the roller may be secured by writing to Mr. Dupre at Columbus, Ohio.

U. S. Rubber Announces Two New Appointments

Harold J. MacDonald has been appointed to the position of Manager, Jobbing Sales, by the United States Rubber Co., New York City, and will be succeeded as Eastern District Sales Manager of the Wire and Cable Department by Howard F. Johnson. Mr. MacDonald has been with the company since 1920, and Mr. Johnson, an alumnus of Brown University, has been connected with the company since 1922.

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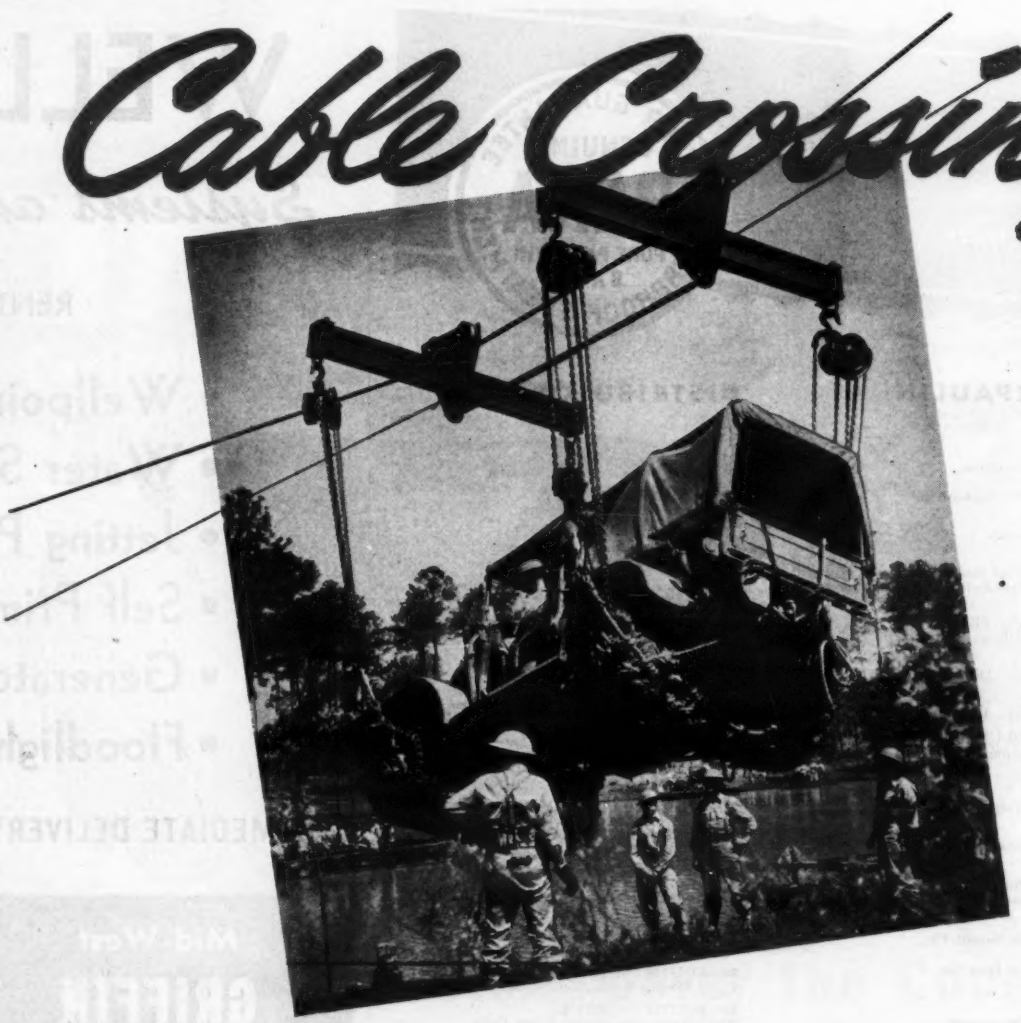

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Planning Needed Now To Aid Reconversion

Maj.-Gen. Philip B. Fleming Again Stresses the Urgency Of Post-War Planning Before State Highway Officials

HIGHWAYS are being pounded to pieces by heavy wartime traffic. A similar deterioration is all too obvious as respects city streets, public buildings, schools, hospitals, sewage-disposal facilities, and water supply and distribution. Merely to make good deferred maintenance would keep many men busy for a long time, so that it would be true to say that our problem is not so much to provide a post-war public-works program as it is to provide for a postponed public-works program. Of course, the deficiencies eventually will be made good. Our principal concern is to see that they are made good at a time when it will contribute most to general recovery, and that time will be immediately after hostilities cease, when private industry must shift into neutral gear, lay off the men and women who have been working on war production, and retool for peacetime production.

Unfortunately, the tendency in America has been to build not in times of depression but in boom times. That has been true both of government and of private interests. Thus, construction usually helps to intensify the boom, but it also competes with other forms of business for men and materials. Our problem, as seen by Major-General Philip B. Fleming, Administrator, Federal Works Agency, is to reverse the historic tendency; to get construction started in time to head off any danger of a depression, rather than two or three years after the war.

Public works, when soundly conceived, carry their own justification. We build highways, schools, hospitals and sewage-disposal systems not just to make jobs, but because we want good roads to drive over, education for our children, adequate care for our sick, and safeguards for our health. But the fact that the construction of such facilities uses a great deal of labor is certainly not an argument against building them. Back in the late '20's, the dollar volume of construction in the United States, maintenance excluded, ran to around $11,000,000,000 a year. At that time construction activities gave employment at the site to between 2,000,000 and 3,000,000 persons. The Bureau of Labor Statistics, after a study of the experience of the non-Federal part of the old public-works program, estimated that for every man-hour worked at the construction site two and one-half man-hours were worked off the site in the production, processing and transportation of the needed materials. The ratio probably was different on the Federal part of the program, and, of course, there is variation depending upon the type of operation. The ratio would be different for roads, for example, than for a new high school or city hall. But if we take the ratio of two and one-half to one as a fair approximation and apply it to the construction picture as it was in the last two years before the depression, we can safely assume that the total number employed in those years in construction and its allied activities was somewhere between 7,000,000 and 10,500,000. If we could, immediately after the war, get as much construction under way as we had back in 1928 and 1929, it would not solve all our problems, by any means, but it could be the very factor needed to prevent unemployment from spiraling downward into a disastrous, nation-wide depression.

Reconversion Will Be Slow

Unwittingly, perhaps, the reconversion problem has been over-simplified in the minds of many. It involves retooling. And this, in turn, involves much more than taking out the war-production machines and putting the old machines back in place. In many cases the old machines have been ground up for scrap and no longer exist. In other instances, manufacturers will wish to take advantage of technological improvements born of war experience, so that totally different machine tools will have to be built. To a considerable extent, therefore, the conversion of plants manufacturing for the consumer market will have to wait upon the reconversion of the machine-tool industry.

Even with the machines at last available, reconversion will not have been completed. Markets will have to be relocated and redeveloped. Wartime inventories will have to be disposed of. The working force will have to be retrained. Channels of distribution will have to be reestablished. All these things cannot be done in a day, or a month, or even six months. And we cannot expect anything even remotely resembling full employment by private business until they have been completed for the greater part of industry.

These are stubborn facts and they provide a sufficient commentary upon optimistic dreams of a great boom immediately to follow the Armistice. For what will there be that the average consumer can buy on the happy day? Of the entire list of commodities which consumers normally purchase, there will be less next year than this year, and even less the year after that, even if the German phase of the conflict ends within the next six months. Many types of consumer goods, such as washing machines and automobiles, embody hundreds of small parts made by small independent manufacturers. These small concerns are now making parts for ships and tanks and airplanes, and these things will still be needed in abundance in order to finish the war in Asia. As a consequence, the small manufacturers will not be ready to assist the big producers just because Berlin has fallen. If large quantities of food and clothing

(*Concluded on page* 53)

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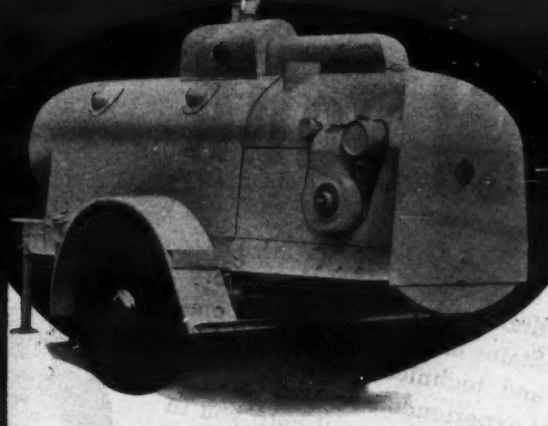

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Folder on Lubrication For Gears and Bearings

Heavy loads and steep grades are tough on the gears and bearings of trucks, tractors, and other hauling and dirt-moving equipment. Proper lubrication will reduce the wear and extend the life of such equipment.

A new 4-page folder on Lubriplate describes the use of this lubricant to condition the surfaces of bearings, gears, chains, and similar parts, and reduce friction, as well as to protect against rust and corrosion.

Copies of this folder No. 11-43 may be secured by interested contractors and state and county highway departments direct from Fiske Bros. Refining Co., Lubriplate Division, 129 Lockwood St., Newark, N. J. Just mention CONTRACTORS AND ENGINEERS MONTHLY.

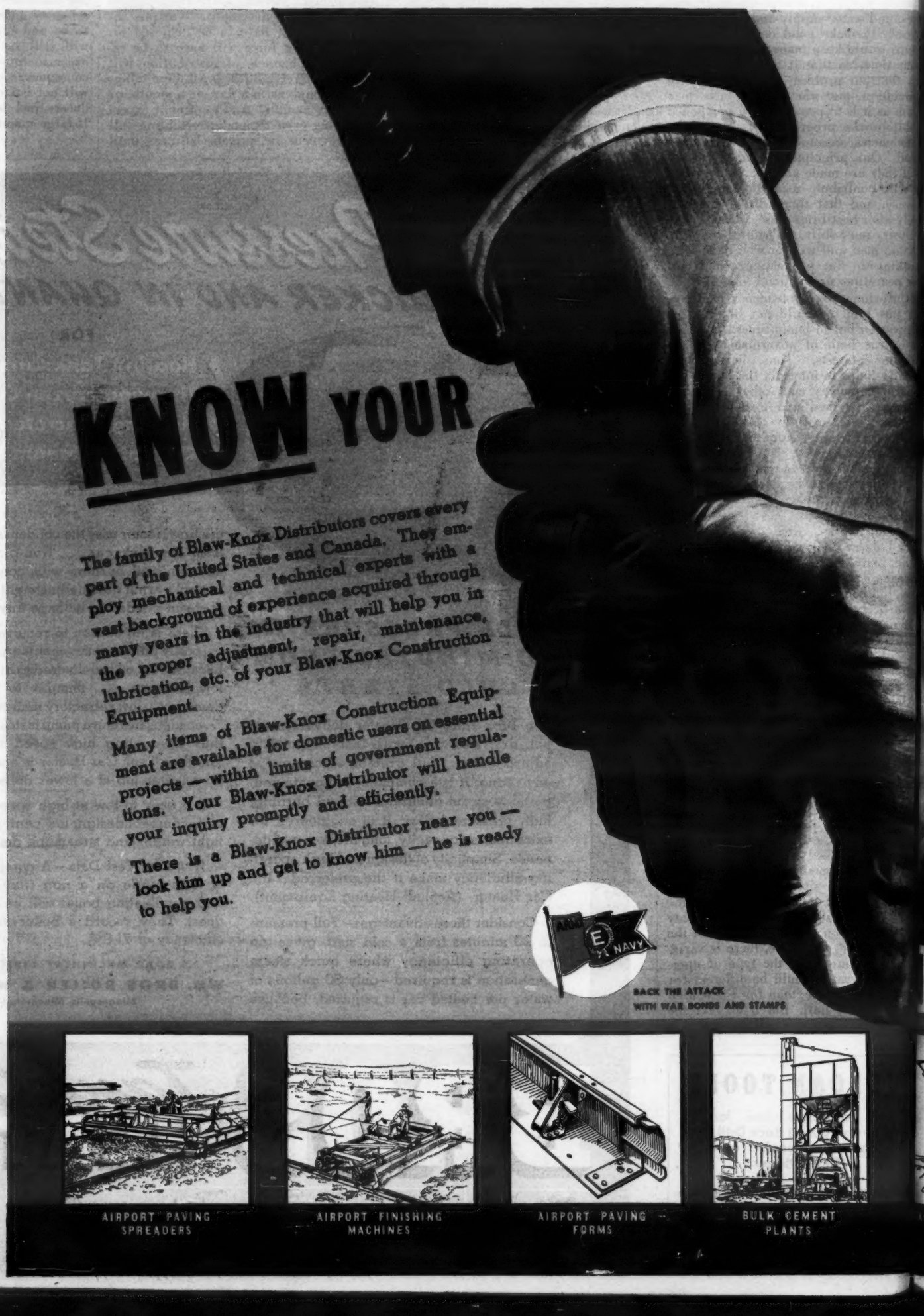
Highway Construction Has Not Wasted Money

In his address as President of the American Association of State Highway Officials, Brady Gentry, Chairman, State Highway Commission of Texas, pointed out, "The highway transportation system of our country is comprised of approximately 300,000 miles of city streets, 500,000 miles of designated state highways, and 2,400,000 miles of rural roads. On this system the cities, counties, states and the Federal Government have expended approximately $42,000,000,000 in less than thirty years. Of this amount the Federal Government expended $8,000,000,000.

"It is true, of course, that some of this $42,000,000,000 was wasted, but it was wasted only in the sense that part of the first billions expended for automobiles was wasted. It took time to make a good automobile and it has taken time to learn to build a good road and what to build it for. The result today is that a substantial part of the road work heretofore accomplished needs to be replaced with modern highway facilities."

Allegheny Ludlum Appoints Huff as New Chief Engineer

E. L. Huff, formerly electrical engineer at the Brackenridge plant of the Allegheny Ludlum Steel Corp., has been appointed Chief Engineer of all the plants of the corporation, according to a recent announcement by F. B. Lounsberry, Vice President in charge of manufacturing.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WPB Approves Work On West Coast Highway

WPB approval for the immediate completion of the Idaho-Oregon-Nevada highway is expected to be of tremendous importance to Idaho farmers in marketing their products, according to a recent announcement in *Highway Highlights*. The project, all in Oregon, near the Nevada line, provides for new construction on 13 miles and the resurfacing of an additional 47 miles.

The route extends northward from Scotts Butte, Oregon, near the Nevada border in the vicinity of Jordan Valley, and will provide a more direct route between Idaho and Oregon production centers for the transportation of food supplies and war equipment to California points.

A Complete Catalog On Form Engineering

A new 66-page catalog, just issued by Williams Form Engineering Corp., Box 925, Madison Square Station, Grand Rapids 7, Mich., contains a wealth of information on the engineering of forms for concrete work. The first part of the book illustrates and discusses Williams form clamps and their use in the economical design of forms. This is followed by a discussion of the cost of clamps per cubic yard with different types of clamps and spacings. Throughout the catalog, various ways of securing corners are stressed as this is generally the point of failure on forms as far as alignment is concerned.

There is a large section devoted to heavy form work on dams and wide wall construction and to the use of screeds and methods of reinforcing slab construction. The catalog is completely indexed to make reference easy.

Readers of CONTRACTORS AND ENGINEERS MONTHLY may secure a copy of this helpful catalog for use in planning future work by writing direct to the manufacturer and mentioning this review.

Brooks Opens Branch Office

Announcement has been made by the Brooks Equipment & Mfg. Co., Knoxville, Tenn., of the opening of a branch office and warehouse at 1410 Cowart St., Chattanooga, Tenn. J. Raymond Johnson will be in charge as District Manager and J. B. Ham will serve as Store Manager.

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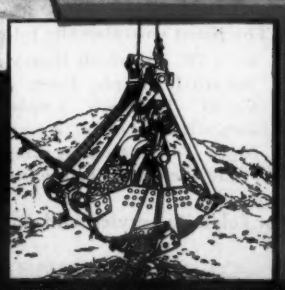
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Grading Operations For Florida Route

(*Continued from page 1*)

to connect the completed road with the new location, lay on the roadbed of the Florida East Coast Railroad which had been abandoned in 1935. Operations on the ½-mile northern section necessitated removal of considerable muck from the tide-level right-of-way as well as its replacement with a stable fill. The remainder of the grading operations consisted of utilizing the old railroad fill, constructed many years before of wet marl which had dried out and become very stable, as a base for operations. Working from this narrow base, it was necessary to mix the railroad embankment with wet marl, pulled in by draglines from adjacent right-of-way, and with the oolite rock which underlay the marl and was obtained in the same manner or hauled in from nearby borrow pits on higher ground, so as to form a stable embankment both wider and higher than that which had been constructed for the railroad.

The job was done by three Speeder draglines of ⅜-yard, ½-yard, and ¾-yard capacity, two Northwest draglines of ½ and ¾-yard capacity, two ¾-yard Marions, a Bucyrus-Erie 30-B, one Hanson ½-yard, and one P & H ¾-yard dragline, all of which were equipped with Page buckets. The machines were shifted as necessary, being used for different purposes at different times and locations to remove the under-water marl and, after subaqueous propagated blasting, the underlying oolite rock. Some were used in other locations to load additional rock from under-water pits where it had been loosened by blasting, and some mixed the dried marl of the old fill with the ballast and local rock to form the embankment which was to carry the 22-foot surface and 7-foot shoulders.

One hindrance to the grading operation was the old trestles which had been used by the railroad in the construction of the original embankment. Much of this fill had been made by dumping wet marl from bottom-dump cars over and around timber trestles built for the purpose and which had been left in place in the railroad fill. Their presence not only interfered with the mixing of the old and new fill material but would have created a serious menace to the stability of the new road if allowed to remain in place. It was therefore necessary to remove all of the old trestle caps and stringers. Where the piles were allowed to remain they were cut off 2 feet below finished grade and their tops beveled to a sharp point so they would not offer obstruction to natural settlement of the new embankment.

A fleet of ninety-two dump trucks of various makes and sizes was used on the project as needed to haul subgrade, base, and shoulder material, and later for hauling surfacing materials.

In locations exposed to wave action, splash walls were constructed by driving the old railroad ties 5 to 6 feet into the ground at the toe of the slope. These were driven by a drop hammer and swinging leads handled by one of the

C. & E. M. Photo

Rock shattered by propagated blasting was loaded into trucks by a state-owned Northwest dragline with a 1-yard Hendrix bucket.

available cranes.

The substantial subgrade was constructed in layers for the full width at the elevation of the bottom of the base and compacted by the passage of hauling equipment and by rolling with two Galion, two Huber, two Buffalo-Springfield, and one Austin 3-wheel 10-ton rollers, shifted as needed between subgrade and base construction. Marl was brought in later and used for the shoulders above this elevation in order to provide material conducive to the rapid growth of protective vegetation.

Base Course

As soon as a section of subgrade was completed, the 8-inch oolite or Key limerock base was placed. Pits from which this rock could be obtained were opened at intervals of approximately 5 miles throughout the length of the project. The rock was drilled by two Cleveland and one Ingersoll-Rand wagon drills with air furnished by one Sullivan 160-cubic-foot and two LeRoi 210-cubic-foot compressors. As much as 160 feet per day of 1½-inch hole was drilled by one of these combinations. After being shot

(*Concluded on next page*)

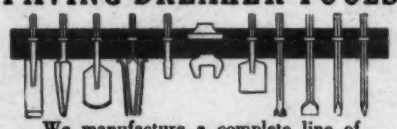
A Chance to Try Out New Transparent Prints

To reduce the time between the development stage and large-scale production of a much-needed new speedy method of printing plans, The Frederick Post Co., Box 803, Chicago 90, Ill., has asked us to request our readers to send for trial quantities of the new transparent ammonia-process Vapo-Vel printing paper. This will be supplied without charge to those writing on their business stationery, with the understanding that they will make a detailed report on the results of the tests. This request is made to confirm or disprove the laboratory and limited field tests which have been made of transparent ammonia-developed prints for fading, keeping quality, stability of image and background, printing and developing speed, sharpness of image, and the ability to pick up both strong and delicate detail.

Those who wish to make these tests should write to the address above, mentioning this item and magazine.

"BICKNELL BETTER BUILT"

PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

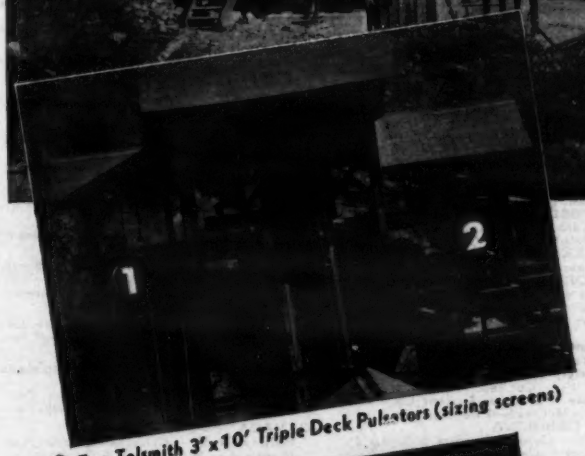
Write for descriptive circular

BICKNELL MANUFACTURING CO.

ROCKLAND, MAINE

Flexibility—to meet varying wartime market

TELSMITH



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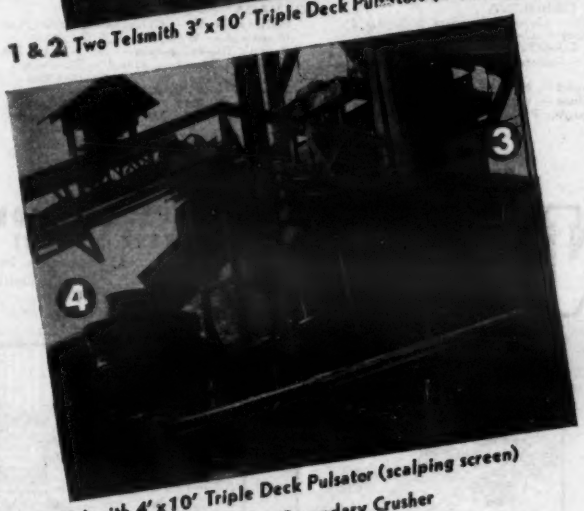

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SMITH ENGINEERING WORKS, 4014 N. HOLTON STREET, MILWAUKEE 12, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

Room 1604—50 East 42nd St. New York 17, N.Y. | 211 W. Wacker Drive Chicago 6, Ill. | 713 Commercial Trust Bldg. Philadelphia 2, Pa. | 19-21 Charles St. Cambridge 41, Mass. | G. F. Seeley & Co. Toronto, Ont. | Mines Eng. & Eqpt. Co. San Francisco 4—Los Angeles

Brandeis M. & S. Co. | Charleston Tractor & Eqpt. Corp. | Roanoke Trac. & Eqpt. Co. Roanoke 7, Va. | Clift L. Priester 911 S. 3rd St., Memphis, Tenn. | Wilson-Weesner-Wilkinson Co. Knoxville 8 and Nashville 6, Tenn.

State Builds Portion Of Key West Highway

(*Continued from preceding page*)

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WON'T QUIT
or cause time out

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

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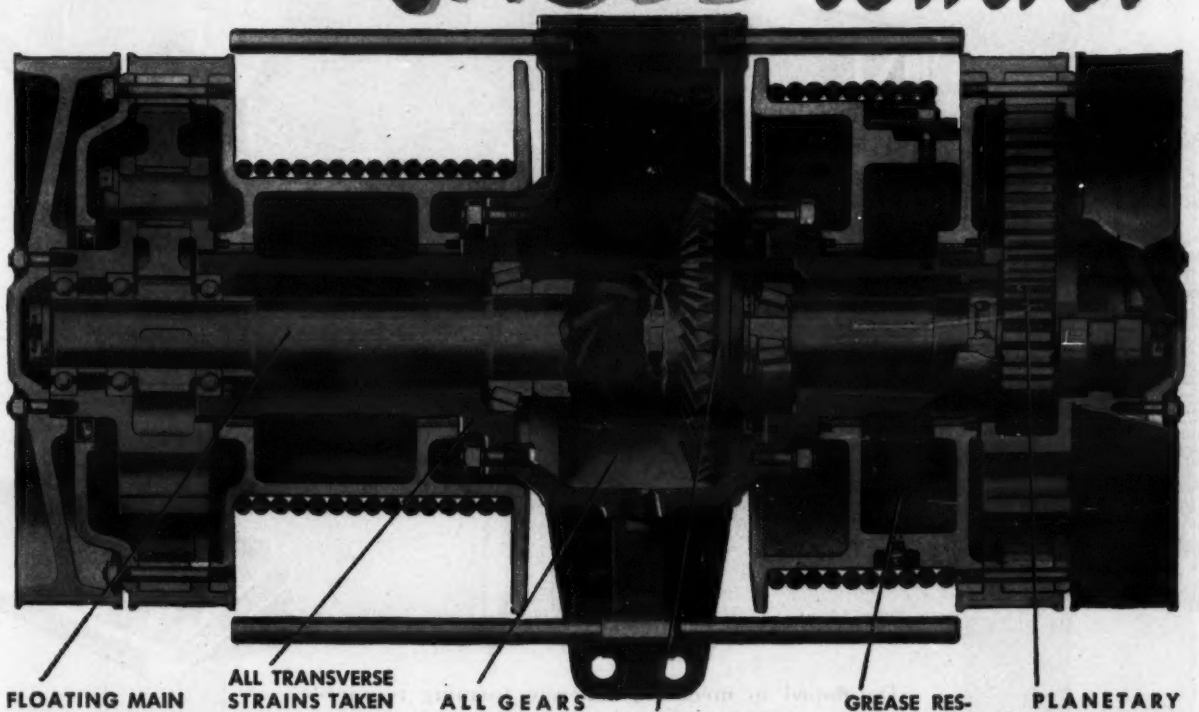
Hayward Buckets

look into CABLE control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... and plan to buy Buckeye

IT'S what is inside a tractor power control unit that makes the difference in job performance. Buckeye Power Control Units are built according to finest engineering practice. The entire mechanism runs in oil, sealed against leakage and dirt. Ball and roller bearings are used throughout. Spiral bevel gear drive provides quiet, smooth running. Big clutch and braking area with external bands and molded brake lining means cool operation, long life. Planetary transmission drive of cable drums provides positive control, smooth action. Full tractor power is transmitted from power take-off through adaptor to winch.

You'll get the most out of cable control when you buy Buckeye.

BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

Trenchers
Tractor Equipment
Road Wideners

Buckeye

Convertible Shovels
Spreaders
Power Finegraders

Grading Operations For Florida Route

(*Continued from page* 1)

to connect the completed road with the new location, lay on the roadbed of the Florida East Coast Railroad which had been abandoned in 1935. Operations on the ½-mile northern section necessitated removal of considerable muck from the tide-level right-of-way as well as its replacement with a stable fill. The remainder of the grading operations consisted of utilizing the old railroad fill, constructed many years before of wet marl which had dried out and become very stable, as a base for operations. Working from this narrow base, it was necessary to mix the railroad embankment with wet marl, pulled in by draglines from adjacent right-of-way, and with the oolite rock which underlay the marl and was obtained in the same manner or hauled in from nearby borrow pits on higher ground, so as to form a stable embankment both wider and higher than that which had been constructed for the railroad.

The job was done by three Speeder draglines of ⅜-yard, ½-yard, and ¾-yard capacity, two Northwest draglines of ½ and ¾-yard capacity, two ¾-yard Marions, a Bucyrus-Erie 30-B, one Hanson ½-yard, and one P & H ¾-yard dragline, all of which were equipped with Page buckets. The machines were shifted as necessary, being used for different purposes at different times and locations to remove the under-water marl and, after subaqueous propagated blasting, the underlying oolite rock. Some were used in other locations to load additional rock from under-water pits where it had been loosened by blasting, and some mixed the dried marl of the old fill with the ballast and local rock to form the embankment which was to carry the 22-foot surface and 7-foot shoulders.

One hindrance to the grading operation was the old trestles which had been used by the railroad in the construction of the original embankment. Much of this fill had been made by dumping wet marl from bottom-dump cars over and around timber trestles built for the purpose and which had been left in place in the railroad fill. Their presence not only interfered with the mixing of the old and new fill material but would have created a serious menace to the stability of the new road if allowed to remain in place. It was therefore necessary to remove all of the old trestle caps and stringers. Where the piles were allowed to remain they were cut off 2 feet below finished grade and their tops beveled to a sharp point so they would not offer obstruction to natural settlement of the new embankment.

A fleet of ninety-two dump trucks of various makes and sizes was used on the project as needed to haul subgrade, base, and shoulder material, and later for hauling surfacing materials.

In locations exposed to wave action, splash walls were constructed by driving the old railroad ties 5 to 6 feet into the ground at the toe of the slope. These were driven by a drop hammer and swinging leads handled by one of the available cranes.

C. & E. M. Photo

Rock shattered by propagated blasting was loaded into trucks by a state-owned Northwest dragline with a 1-yard Hendrix bucket.

The substantial subgrade was constructed in layers for the full width at the elevation of the bottom of the base and compacted by the passage of hauling equipment and by rolling with two Galion, two Huber, two Buffalo-Springfield, and one Austin 3-wheel 10-ton rollers, shifted as needed between subgrade and base construction. Marl was brought in later and used for the shoulders above this elevation in order to provide material conducive to the rapid growth of protective vegetation.

Base Course

As soon as a section of subgrade was completed, the 8-inch oolite or Key limerock base was placed. Pits from which this rock could be obtained were opened at intervals of approximately 5 miles throughout the length of the project. The rock was drilled by two Cleveland and one Ingersoll-Rand wagon drills with air furnished by one Sullivan 160-cubic-foot and two LeRoi 210-cubic-foot compressors. As much as 160 feet per day of 1½-inch hole was drilled by one of these combinations. After being shot

(*Concluded on next page*)

A Chance to Try Out New Transparent Prints

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12 LIME STREET ROCKLAND, MAINE

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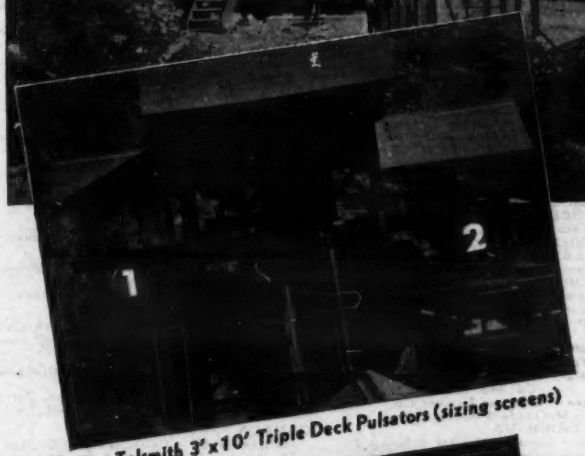

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Brandeis M. & S. Co. Louisville 8, Ky. | Charleston Tractor & Eqpt. Corp. Charleston 22, W. Va. | Roanoke Trac. & Eqpt. Co. Roanoke 7, Va. | Clift L. Priester 911 S. 3rd St., Memphis, Tenn. | Wilson-Weesner-Wilkinson Co. Knoxville 8 and Nashville 6, Tenn.

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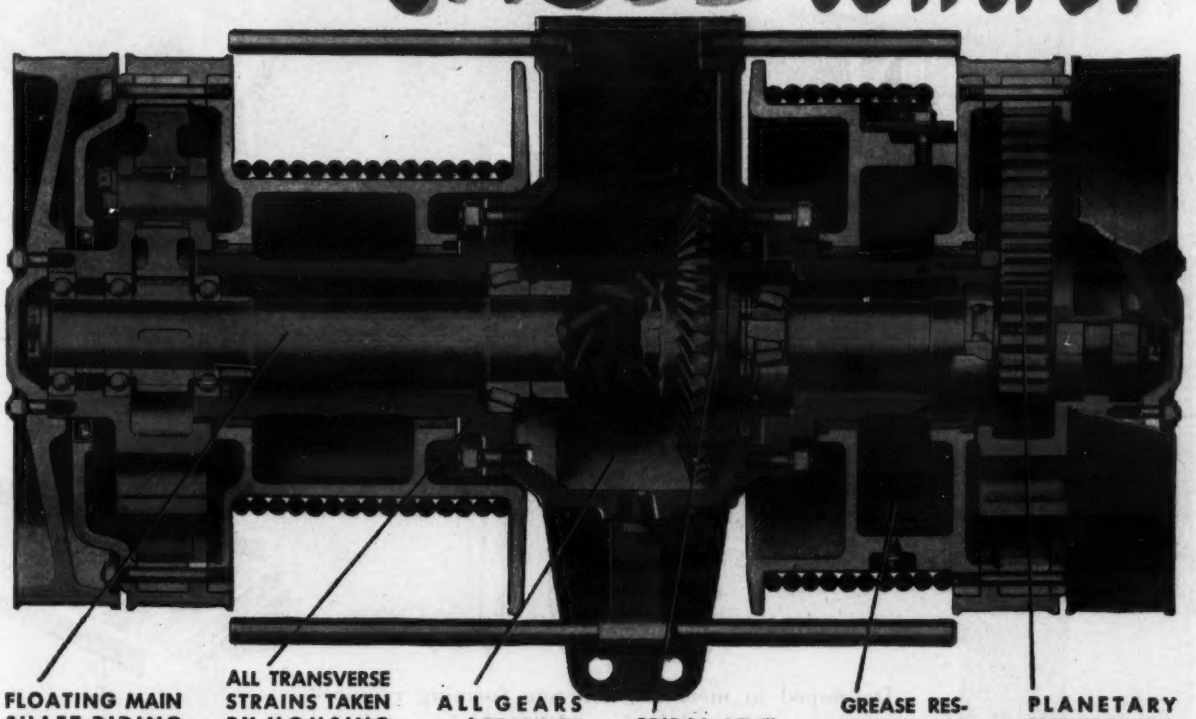
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BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

Trenchers
Tractor Equipment
Road Wideners

Buckeye

Convertible Shovels
Spreaders
Power Finegraders

Lincoln Plans Contest For Post-War Suggestions

In order to gather together the ideas of its personnel to assist the management in planning for the future, a competition among employees has been inaugurated by the Lincoln Electric Co., Cleveland, Ohio, for suggested products to be manufactured after the war, which are in line with the company's present production and experience. The first prize will be $500, the second $300 and the third $100. The contest closes July 1, 1944. This competition will in no way interfere with the regular suggestion system in operation at the Lincoln Electric Co.

New Davey Dealers

Announcement has been made by the Davey Compressor Co., Kent, Ohio, of the appointment of three new distributors for Davey portable and industrial compressors, truck power take-offs, and pneumatic saws.

The Curry Equipment Corp, 1435-7 N. 31st St., Philadelphia 21, Penna., of which Glenn M. Curry is President, will serve Davey customers in eastern Pennsylvania, southern New Jersey, Delaware and adjacent territory. Another new Davey distributor is the E. H. Kliebenstein Co., 856 E. 136th St., New York City, which serves metropolitan New York. E. H. Kliebenstein, General Manager of the firm, was formerly Eastern Sales Manager for the Link-Belt Speeder Corp., and is well known among easter contractors. The third new dealer is th Wentz Equipment Co., 600-08 No. V Buren St., Topeka, Kansas, for the Kan sas area.

All three companies will carry a stock of parts and provide local servic for Davey equipment in their respectiv territories.

Eighty-six per cent of motor vehicl travel in 1941 was done on 25 per cen of the street and road system.

THE *New* HELTZEL
DUAL DUTY AIRPORT HIGHWAY FORM

Developed to meet the concrete forming requirements in airport slabs from 12 to 24 inches thick. Bases are 10 and 12 inches wide. Dual Stake Pockets and Double Treads permit the form to be used with either dimension for the webb.

Sections are 10 and 15 feet long and provide the means of forming both concrete airport slabs and access roads with a single set of forms.

Another Heltzel VICTORY Development. Ask for bulletin B-19-A.

Fig. 1. Setting forms for a 15" concrete airport runway.

Fig. 2. Finishing a slab 25' wide, 15" thick in one pass.

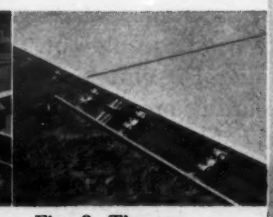


Fig. 3. The same set of forms used with the 10" base as the webb.

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO · U. S. A.

HELTZEL SUPERIOR CONCRETE CONSTRUCTION EQUIPMENT

MILITARY HIGHWAY FORMS
AIRPORT FORMS
DUAL DUTY AIRPORT HIGHWAY FORMS
CURB, CURB AND GUTTER OR SIDEWALK FORMS
PORTABLE AGGREGATE BATCHING BINS —30 TO 100 TONS CAPACITY
PORTABLE AND SEMI-PORTABLE BULK CEMENT BATCHING BINS FROM 100 TO 750 BARRELS CAPACITY
CENTRAL MIXING PLANTS
CEMENT TANKS TO 1500 BARRELS
TREMIE CHUTING
CONCRETE FLOOR HOPPERS
CONCRETE BUCKETS

Municipal Airport Improved for Army

Runways Trebled in Width, New Taxiways and Drainage Completed, Erosion Control By Sprigging and Sodding

✦ THE municipal airport of Tallahassee, Fla., was one chosen for improvement under the CAA program and later extended and further improved by the Army. The original field had three 2,000-foot runways 100 feet wide, which have been extended to 5,200 feet, widened to 300 feet, and 50-foot taxiways and a complete new drainage system added. The use of local materials from borrow pits in the rolling terrain within the reservation made possible considerable economy in the completion of the road-mix runways.

An entirely new drainage system was installed in the field, using 12 to 66-inch concrete pipe, all plain except the 54 and 66-inch sizes. The three original runways were built on soil-cement bases, but all the new construction is on the existing sand-clay subgrade, which was entirely acceptable, except in a few low sections, and was not disturbed.

Road-Mix Runways

The local pit-run sand aggregate from borrow pits within the reservation had the following sieve analysis:

Proportionate Amount (Square-Mesh Sieves)	Percentage By Weight
Passing ⅜-inch sieve	100 per cent
Passing No. 4 sieve	70 to 100 per cent
Passing No. 10 sieve	50 to 85 per cent
Passing No. 40 sieve	25 to 45 per cent
Passing No. 80 sieve	14 to 25 per cent
Passing No. 200 sieve	6 to 14 per cent

The material was excavated by three elevating graders, shovels, and draglines and loaded to a fleet of as many as 100 trucks on short hauls. The deepest cut in the grading operations on the project was 8 feet, and the highest fill 15 feet.

The sand aggregate for the road-mix runway paving was dumped in a series of piles down the full 100-foot width of each widening section of the runway in sufficient quantity to give a loose layer 12 inches thick. This was shot by a distributor with a 10-foot spray bar, making five trips to give a 50-foot area for mixing. The RC-1 was shot in four applications each of 1 gallon per square yard and thoroughly mixed after each application. The sand aggregate with the asphalt was first bladed so as to fold the asphalt inside, then a Jaeger multi-blade traveling mixer was pulled through, and the mixing completed with the blades of seven power graders. The mixing was done for a depth of only 6 inches. When the material was homogeneous, it was given a final mixing and breaking up with a disk harrow, then bladed to the proper cross section, and compacted by a rubber-tire roller.

An application of 0.5 gallon of the asphalt was used after the final placing of the material in proper contour to enrich the top and fill the voids, thus increasing the waterproof qualities of the surfacing. This was applied after the top had been again broken up with the disk harrow and was mixed in by blades and finally compacted by the same rollers used for the initial compaction. A final seal of the surface was effected by the application of the last 0.5 gallon per square yard of the total asphalt applied. This final seal was not blotted but left on the surface to cure without traffic.

The total area of road-mix operations, including runways, widening and extension, and taxiways, was 379,192 square yards. The quantities involved were:

Excavation	790,700 cu. yds.
Borrow, for road-mix aggregate	30,470 cu. yds.
Bitumen, RC-1	1,895,960 gals.
Pipe, 10 to 66-inch diameter	1,535 lin. ft.

Erosion Control

Two 12-yard LeTourneau Carryall scrapers were used by the contractor for trimming the flat slopes at the edge of the field and for filling low spots left in the original grading. The slopes of the shoulders at the sides of the runways varied in degree, according to the contour of the field, but were very flat and mostly less than 1 inch in 12.

In order to insure quick growth of grass to prevent dust and also to increase the stability of the shoulders in case planes operated on them, a distance of 50 feet on both sides of the runways was sodded or sprigged. The periphery slopes were all laid down as flat as possible, varying from 2½ to 1 to 4 to 1. These were strip-sodded to check erosion and fertilized to stimulate rapid growth of the grass to cover the slopes. Solid sod was used on the berms, headwalls, and ditch-bottoms to prevent the start of erosion from the beginning.

Service Roads

The service roads at the field were built of cold-mix delivered by rail from Birmingham, Ala. The main road is a 4-lane 40-foot artery, while the other service roads are 30 feet wide. All are 5 inches thick on an 8-inch sand-clay base compacted by sheepsfoot rollers and rubber-tire rollers.

Personnel

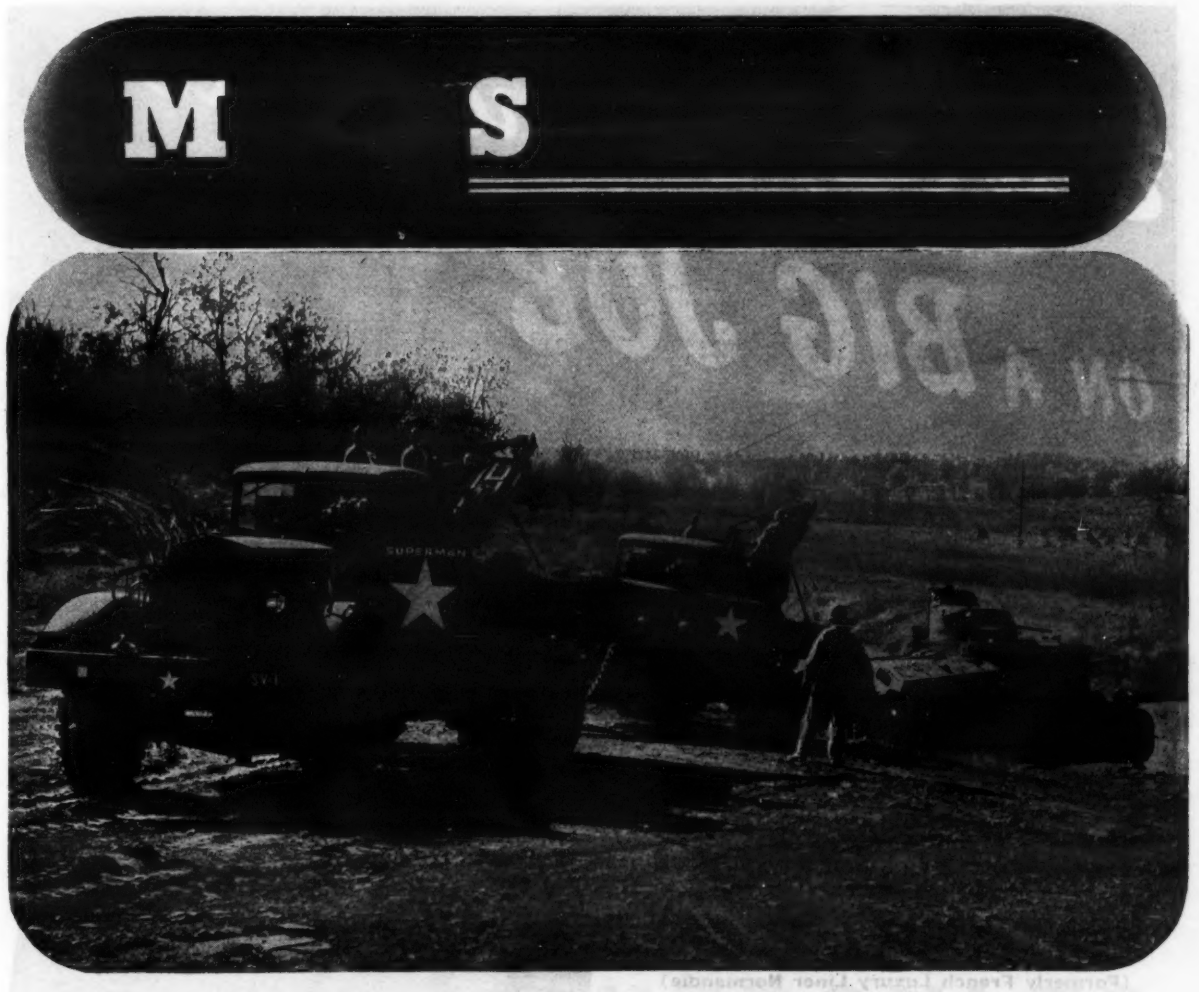
The original contract for the grading and paving of Dale Mabry Field was awarded by the U. S. Engineer Department to W. L. Cobb Construction Co. and R. C. Foster of Tampa, Fla., with the former doing the paving and the latter the grading. Leland Cobb is President of W. L. Cobb Construction Co., and Henry Harrison was Superintendent for all operations. For the U. S. Engineer Department the work was in charge of Capt. J. R. Bracewell, Jr., as Area Engineer, with Capt. Earl M. Stoves as Resident Engineer.

Inspection of Sheaves Used with Wire Rope

The second in a series of pamphlets issued by Roebling to aid in the conservation of time and materials is devoted to the inspection of sheaves used with wire rope. Prepared by A. J. Morgan, Chief Engineer, Wire Rope & Strand Division, John A. Roebling's Sons Co., describes briefly and helpfully the proper procedure for inspecting wire rope and the equipment on which it is being used.

The article points out that the principal items to be checked are sheaves, drums, reeving, and general operating conditions, and then discusses in detail the points to be checked on sheaves, what to look for and how to correct unsatisfactory conditions. The folder also contains drawings illustrating the importance of proper-sized sheaves for the rope used over them.

Copies of this instructive folder No. 2 may be secured without obligation direct from John A. Roebling's Sons Co., Trenton, N. J.



The Heavy Wrecker

leading the procession may be No. OOW212 to the Ordnance Department, but it's "Superman" to the fellow who drives it. If your eyes are sharp, maybe you can recognize the second truck as "MacArthur". A "cute" little 28 thousand pound job in Tunisia was affectionately christened "Amapola" by its crew.

When our soldiers apply such nicknames to the planes, tanks and trucks they operate, it's a completely unofficial but particularly sincere endorsement of equipment they have come to like, respect and depend on.

If we have the postwar privilege of supplying you with trucks engineered to the job they are to perform, we think you will find them similarly deserving of admiration and confidence of those who use them.

● FIRE APPARATUS

WARD LaFRANCE
TRUCK DIVISION
GREAT AMERICAN INDUSTRIES
★ ELMIRA ● NEW YORK ★

● COMMERCIAL TRUCKS

© 1944 G. A. I., Inc., Meriden, Conn.

The new Bucyrus-Erie Dozershovel.

New Two-In-One Unit For Dirt-Moving Jobs

With a record of extensive service with the armed forces for whom it was designed and manufactured, a new two-in-one dirt-moving unit known as the Dozershovel has recently been announced by the Bucyrus-Erie Co., South Milwaukee, Wis. This announcement results from the fact that production in excess of military demands has made a limited number of this unit available for civilian use under government release.

Designed for use with the T9 or TD9 International TracTracTor, the Dozershovel provides full-fledged tractor shovel and bulldozer service, with simple interchangeability of bucket and blade permitting in-the-field changeovers in a few minutes, the manufacturer states. This changeover requires merely the removal of five pins holding the bucket, trip latch, and limit chains; setting the other unit in place; and replacing the pins.

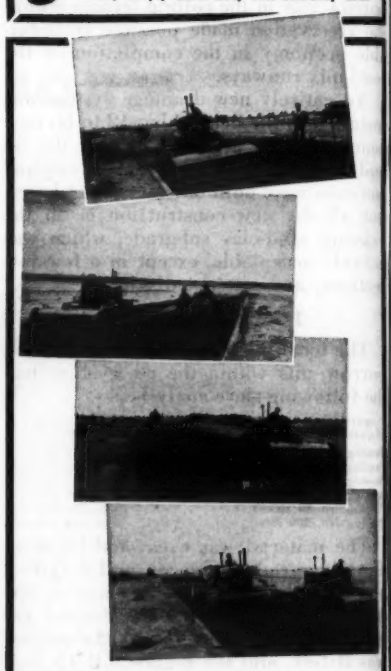
As a shovel, the Dozershovel's hydraulic control provides a down pressure up to 4,200 pounds for real bites into the dirt and full payloads in a short distance of travel. The same control on the bulldozer provides easy penetration in hard materials and ability to hold the cut. Strong side arms permit the shovel to lift big loads, and the 'dozer to handle any bulldozer job. The unit's tripping mechanism makes it possible to tip the bulldozer blade forward to release the load on uphill 'dozing. Another feature is the standard hook on the upper edge of the shovel bucket or bulldozer blade, giving a third application of lifting-crane service. This is especially handy in loading or unloading the extra blade or bucket into or from the truck.

Visibility without "blind spots" permits accurate dumping and reduces operator fatigue, besides increasing the unit's maneuverability and speed, the manufacturer states. Its traveling height of only 8 feet 1½ inches allows it to get in and out of buildings, to work in close quarters, and to be transported on trailers over the highways and through underpasses. The Dozershovel has oscillating tracks for stability on uneven ground, and high lift for fast work in loading trucks.

Detailed information on the Dozershovel may be secured direct from the manufacturer by referring to this item.

Byrne of du Pont Retires

Announcement has been made of the retirement of Francis J. Byrne, Assistant Director of the Public Relations Department of E. I. du Pont de Nemours & Co. Mr. Byrne, who has been with du Pont for 27 years, also supervised the publicity committee of the Institute of Makers of Explosives.



IT DOES THE JOB THOROUGHLY, RAPIDLY, AND ECONOMICALLY

The AGGMIXER operates with other general purpose road equipment—from power take-off shaft of any suitable tractor—easy and safe to operate. The swirling chopping action of the AGGMIXER tines does a thorough job of mixing—wet or dry.

Send for job facts now.

Awarded Oct. 30, 1943

ORDNANCE — UNITED STATES ARMY

ARIENS COMPANY
BRILLION, WISCONSIN

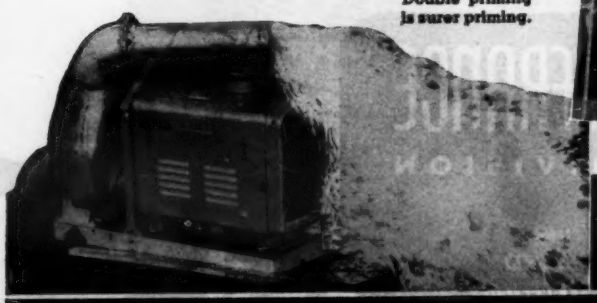
ACME

FLOATING THE U.S.S LAFAYETTE

(Formerly French Luxury Liner Normandie)

CMC ten-inchers have been on the job day and night on this great salvage job. More than 40 CMC Dual Primers have pumped tons of WATER from the hull of the LAFAYETTE. The Navy and Merritt, Chapman, Scott Corporation have done a magnificent job, and we are especially proud that CMC Pumps had a part in it.

CMC 10" Dual Prime Centrifugal. Other sizes from 1½" up. Double priming is surer priming.



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Equipment for Sale

Barber-Greene Hot Asphalt Plant, Utility Size. Less than two years old.

Two Seventy-horsepower Boilers
Six Storage Tanks
One Heavy-duty Truck Scales

Address Box 241
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Notebook Reminder Aid to Job Safety

Frequent Study of Job Accidents and Operation Record Makes Safer and Better Operators

By W. J. "BILL" BROKAW

(Since 1933, Bill Brokaw has been operating wire-rope-equipped machines of all types. At present he is elevating-grader and dragline operator for the M. W. Watson Co., Topeka, Kansas)

Bill Brokaw at the controls of his elevating grader, and a scene on a "rush" job of raising 5 miles of dike along the Missouri River.

✦ "SAFETY is a full-time job", I once read somewhere and I agree. But I'd like to add that no matter how much time a machine operator spends on a safety campaign, he needs a few of the right sort of reminders now and then. An accident, or a near one, is an unpleasant thing to remember. We'd much rather remember the times when we rushed through a job, without a single accident, and delivered our end of the assignment ahead of time.

Maybe it was a job such as we completed not long ago along the rising Missouri River. Here we worked two 12-hour shifts, four days and three nights, building a dike, and as fast as we raised the dike a foot, the river came up a foot and 3 inches. We raised 5 miles of dike over 2 feet. The river side was too wet for the elevating grader, and we had to use trucks, in some instances with a haul of over 4 miles. But we did the job, saved 3,000 acres of vegetable gardens, and, we are glad to remember, without a single accident to workmen or machines.

But let's take another case. Not long ago I was on a rush job at an Army air base. We were trying to meet a deadline and didn't wait for wire-rope replacements which were on the way. We used about 3,000 feet of wire rope on the job, of the ordinary type and most of it rope which had already been retired. As a result, seven or eight cases of infection developed from snagged hands, and one break resulted in a leg injury. Since most of the men were in the habit of working with preformed rope which didn't snag, they were too late in learning how to handle the old rope to avoid injury.

An honest estimate of the time lost because of the accidents which could have been avoided by waiting for the new preformed cable would be far greater than the hours of lay-up, had we stopped and waited for deliveries.

After the accidents, our foreman admitted that he could recall similar accidents on previous jobs, but that he had forgotten about them. This illustrates what I mean about the need for reminders.

Reminder System

I have a system which will not allow me to forget things like that. I keep a daily diary, in which I record all operation faults. But that's not all. Once a week I go over my record and check such cases and study them. And when I have the chance I discuss with others how they could have been avoided.

Some operators tell me that they can remember all they want to remember about accidents. But I can't. Unless I study my record and look for better methods whereby I can correct my errors, I find that I soon forget about all but the "slick" jobs where there were no accidents or faults. The lesson I should have learned is gone, and with it the picture of what happened and what could be done another time to avoid a "repeat".

This may sound elementary, but I have found in my experience that it is often lack of attention to the simple things which is the cause of complicated accidents. I have often urged other machine operators to try my diary or record system, and many of them are following the plan. I think they are better operators because of it, and I know they have fewer accidents.

Accident Costs

Another thing I have learned from studying my accident and daily operation record is that the cost of time spent in extra precautions and in being a safe operator is infinitesimal, compared with results. I have recorded figures to prove this. There is no way to estimate the total cost of accidents to persons, but I have some cases on record where the

(*Concluded on page 66*)

SAND'S-STEVENS
Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

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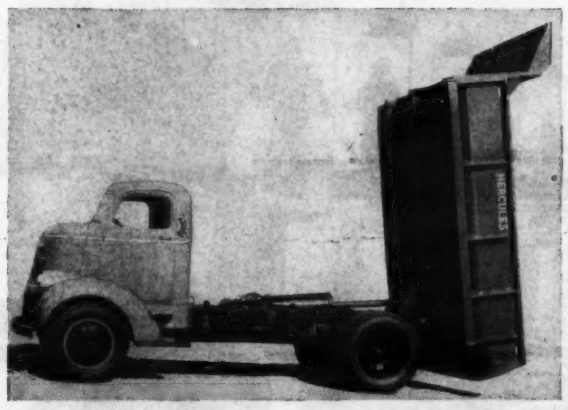
8531 Gratiot Ave. Detroit, Mich.

BODIES and HOISTS
LIKE THESE
by HERCULES...



Hercules High Dumper—Power up, power down with 78° dumping angle. Equipped with 12 ton capacity heavy duty hoist.

Hercules Low-Mount Sanitary Body—One of the many types available, and there's a Hercules Hydraulic Hoist for each size.

Hercules Braced Side Rub Rail Body—Built to handle 6 to 8 yards of material, thus insuring profitable operation. These bodies and the Hercules Hydraulic Hoists used with them, are supplied in many sizes.

Hercules 6-Batch Coal Body—Capacity approximately one ton per batch compartment. Latches shown on body side release the swinging partition gates.

are giving maximum service with minimum expense, day after day, on the home front.

"Victory is our business", and our war production is playing an important part in bringing victory nearer; but production for essential civilian use is also important, and we're able to make quick deliveries on many types of Hercules Hydraulic Hoists and Bodies to you.

See your Hercules Distributor, or send inquiries direct to us.

HERCULES
STEEL PRODUCTS CO.
GALION, OHIO

Decline in Construction Releases Much Man-Power

The current decline in construction released about 500,000 men for other employment by the end of 1943, the War Manpower Commission announced recently. Since the wartime peak of 2,190,000 men in the autumn of 1942, construction employment has fallen steadily until it reached about 1,066,000 in the same period of 1943.

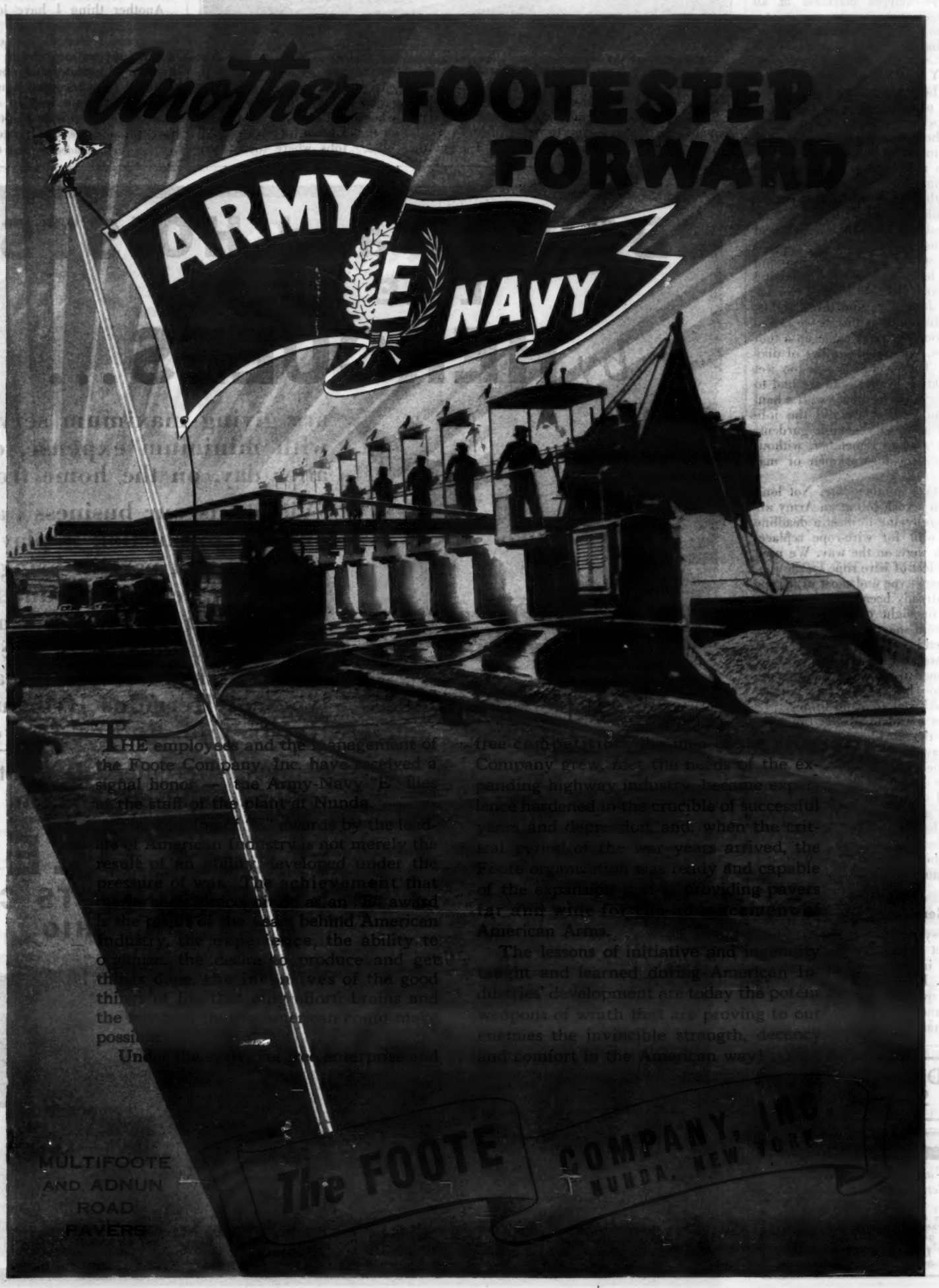
Labor-market information indicates that the decline will continue to about 600,000 or 700,000 in January, 1944, and to 500,000 or 600,000 in July, 1944. These estimated total employment figures for 1944 may be higher since some projects are behind schedule and there is also a possibility that lay-offs on many of them are being postponed by reduction of long work-weeks. However, the decline is inevitable, even if its full impact is delayed.

Between July and November, 1943, more than half of the 267,000 construction workers released were in areas of acute labor shortages, thereby facilitating their rapid reabsorption into industry. In addition, approximately 19,000 workers were released in areas anticipating a labor shortage, where the demand for male labor was strong.

In areas where the labor supply is adequate, the WMC is recruiting displaced construction workers for transfer. Unskilled construction workers are readily absorbed in a large number of war industries where the need for their labor is urgent. Skilled and semi-skilled workers, the Commission states, can best be utilized in shipbuilding. Recent occupational studies show that 40 of the 90 construction occupations are to be found in shipbuilding and that the rest are closely related. Many construction skills can also be used in aircraft plants, foundries and machine shops.

New District Manager

The Westinghouse Electric & Mfg. Co., Pittsburgh, Penna., has announced the appointment of Peter L. Lenz as Manager of its Middle Atlantic District Manufacturing and Repair Department with headquarters in Philadelphia. Mr. Lenz, who has been associated with Westinghouse since 1925, has been active in the manufacturing of a-c and d-c motors and generators, and in the development of the Ignitron, the modern form of mercury arc rectifier which makes possible the large-scale production of aluminum and magnesium.


Another FOOTESTEP FORWARD
ARMY
E
NAVY
THE employees and the management of the Foote Company, Inc. have received a signal honor — the Army-Navy "E" flies at the staff of the plant at Nunda.
MULTIFOOTE AND ADNUN ROAD PAVERS
The FOOTE COMPANY, INC. NUNDA, NEW YORK

Equipment Rebuilt Almost "Good as New"

Unusually Well-Equipped Shops of Georgia Highway Department at East Point Serve Well in Time of War

HOUSED in a group of World War I galvanized-iron hangars at East Point, Ga., is a series of shops that are literally working wonders for the State Highway Board of Georgia. Understaffed because of the lack of machinists and mechanics, and needing some house-cleaning because there is not the time to pick up, they are, in spite of all this, more than justifying their existence by living up to the remark made by the Superintendent of Equipment, "Our aim is to rebuild to 80 per cent as good as new". They also build new equipment and make parts that cannot be purchased in these times. An example of this is the track bolts for heavy tractors which were being cut and threaded at the time of our visit.

Organization

The organization for the care of equipment in Georgia consists of the Equipment Engineer at Atlanta, the East Point Shops, at which the Superintendent of Equipment makes his headquarters, and the shops at Douglas, Ga., which take care of the major overhaul and repairs of equipment for the southern part of the state. There are also maintenance shops at Cartersville, Gainsville, Thomaston, Albany, Swainsboro, and Augusta, which do tune-up and trouble-shooting.

The Superintendent of Equipment travels over the state, checking the condition of equipment at all the shops and out in the field. If a piece of machinery is in need of more work on it than can be done at the maintenance shop, he sends a letter to the shop ordering the designated equipment sent to the East Point or Douglas shop for overhaul. It arrives soon after, via equipment trailer or truck. This sometimes means a rather costly overhaul job, as it includes all electrical and other work that formerly was farmed out or else the part was discarded and a new one installed. Today, with the scarcity of most parts and the shops to which one might have turned in the past operating on war work far different from their peacetime activities, the state shops are called upon to go the limit to keep the equipment rolling and to maintain the "80 per cent as good as new" slogan. And they do it.

Very little work is done on motor cars, as it is the policy of the State Highway Board not to own passenger cars but to have employees needing such transportation use their own cars with "C" gasoline-ration cards for essential driving and to pay them 5 cents per mile for the use of the cars. Thus the pick-up is the first piece of motor equipment that comes into the shops, followed by the trucks, tractors, power graders, rollers, etc.

The Tractor Shop

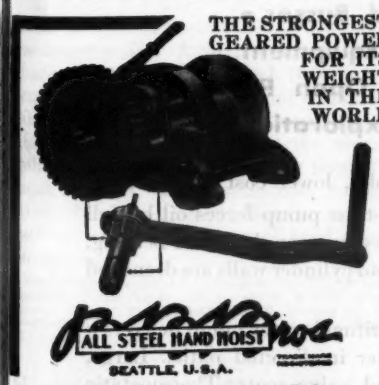
In this article we are describing the East Point shops and services, which were established in 1922 and, as mentioned before, are housed in a group of hangars of that era. The warehouse at the East Point Shops is the old highway-department office building which was abandoned when the new building was erected in Capitol Square, Atlanta.

The tractor shop is a 40 x 200-foot structure equipped to rebuild all types of tractors. Just outside the main door of the shop is a heavy steel frame with an air motor to operate a chain hoist which is used for unloading tractors, or other heavy equipment, from the trailers when they are brought in for overhaul. Inside, a continuous bench runs along the northwest side of the building, making every foot a potential stall for the overhaul of a piece of equipment. At the end is a small locked tool room where special wrenches, used only on one type of equipment, or large Stillsons which are not needed regularly are kept under lock and key. Nearby is a special tool, rebuilt in the shop, for dressing off track rollers after building them up with welding rod. An Allis-Chalmers motor-driven garage compressor near this end supplies all the air for all purposes for this shop.

Each piece of equipment that is received in the shop is given a job number. These start with "1" at the beginning of the fiscal year and then, if the work runs over into the next fiscal year, it is given a letter to identify it as a hold-over job. All parts and labor are charged to the job number so that when it is sent out of the shop, the exact cost of the overhaul is known.

Two 5-ton wall cranes run the entire length of the shop, serving every foot of the floor area. One was purchased complete and the other built in the shop. The shop-built crane covers one-third the area and the other the remainder. As one walks along beside the continuous bench, it is easy to observe the reasons for the thoroughness of the work done. A brake riveter is installed; then the separate tool boxes of the various mechanics were noted open on the bench, but are put away for safety at night. Other equipment includes a large hydraulic press and a mechanical press, both of World War I vintage but doing their work valiantly; then a heavy drill press and a buffer and grinder. The pan method of keeping torn-down equipment together is used, with a separate

(*Continued on page* 50)



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ALL STEEL HAND HOIST

SEATTLE, U.S.A.

Compact—Powerful—Safe

STANDING ROOM ONLY FOR DURATION

Beebe Bros. All-Steel Hand Hoists carry the highest resale value of any piece of equipment in the world. If you have one not in use, sell it. Many more than are available are urgently needed in the win-the-war program. Thanks.

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WE ARE NOT MAKING AS MANY CALLS AS WE DID —

LIMA

LIMA LOCOMOTIVE WORKS, INCORPORATED
SHOVEL AND CRANE DIVISION
LIMA, OHIO

but we want you to know that we are still on the job building Cranes, Shovels and Draglines without precedent, most of them earmarked for the "Armed Forces". With Uncle Sam demanding the greater part of our output and the fact that many of our sales representatives and service men have answered the call to the colors, while others are now procuring and expediting materials, we have been unable to make as many calls as we would like to on our friends and customers.

We miss those friendly contacts and opportunities to serve you. Let us hope that it will not be long before we can see you regularly and give your excavator needs our undivided attention. Your patience has been magnificent when we have had to say "no" when you needed that new LIMA so badly, but we know that you like ourselves have but one thought in mind—VICTORY and until then the armed forces must continue to have preference.

LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division - - - - - - LIMA, OHIO

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LIMA SHOVELS CRANES. DRAGLINES

SHOVELS, ¾ YD. TO 3½ YD. CRANES, 13 TONS TO 65 TONS
DRAGLINES, VARIABLE

Duquesne Way Aids Traffic in Pittsburgh

(*Continued from page 23*)

two holes for the dowels were bored by an air auger held in a special guide which insured a vertical hole at exactly the proper distance from the end of the timber.

The only pedestrian access to the wharf area between the demountable guards and the river is a stairway at the Sixth Street Bridge. Boatmen can, however, also come down from the upper roadway by means of ladders built into the upper wall about half way between each bridge.

The Upper Roadway

The upper roadway behind the flood wall, which is also a retaining wall, is about 20 feet above normal pool at its lowest point and is therefore protected from all but the worst floods. Inasmuch as the U. S. War Department is expected to continue its program of flood control on the Allegheny River, Pittsburgh does not expect a repetition of any of the worst floods of the past. This upper roadway, the west-bound lanes of which are adjacent to the retaining wall, is for local traffic and has connections to the principal intersection streets in the length of Duquesne Way and to the three bridge approaches. East-bound local traffic is on the existing Duquesne Way, the repaving of which is included in the present improvement. There are also frequent turnarounds to take care of one-way traffic entering the east-bound lane and wishing to go west.

Street cars were removed from the upper level of Dusquesne Way between the Sixth Street Bridge and Fancourt Street, a distance of about 1,000 feet, to relieve traffic congestion and were replaced with about 500 feet of street-car track in the intermediate strip between the east and west-bound upper roadways.

It is hoped eventually that some means will be found to eliminate the elevated steam railroad still running through the central mall of Duquesne Way on the upper level. When this is possible, considerable additional improvement can be made in this area.

Triangular Development

The Water Street Boulevard, completed by Allegheny County along the Monongahela River about three years ago, is similar to Duquesne Way. The next step in the completion of this triangular improvement surrounding The Point, creating through highways completely around the Golden Triangle, will be a Cross-Town Boulevard leading from Liberty Bridge to Eleventh Street and a grade separation at The Point itself to connect the Water Street and Duquesne Way portions.

C. & E. M. Photos

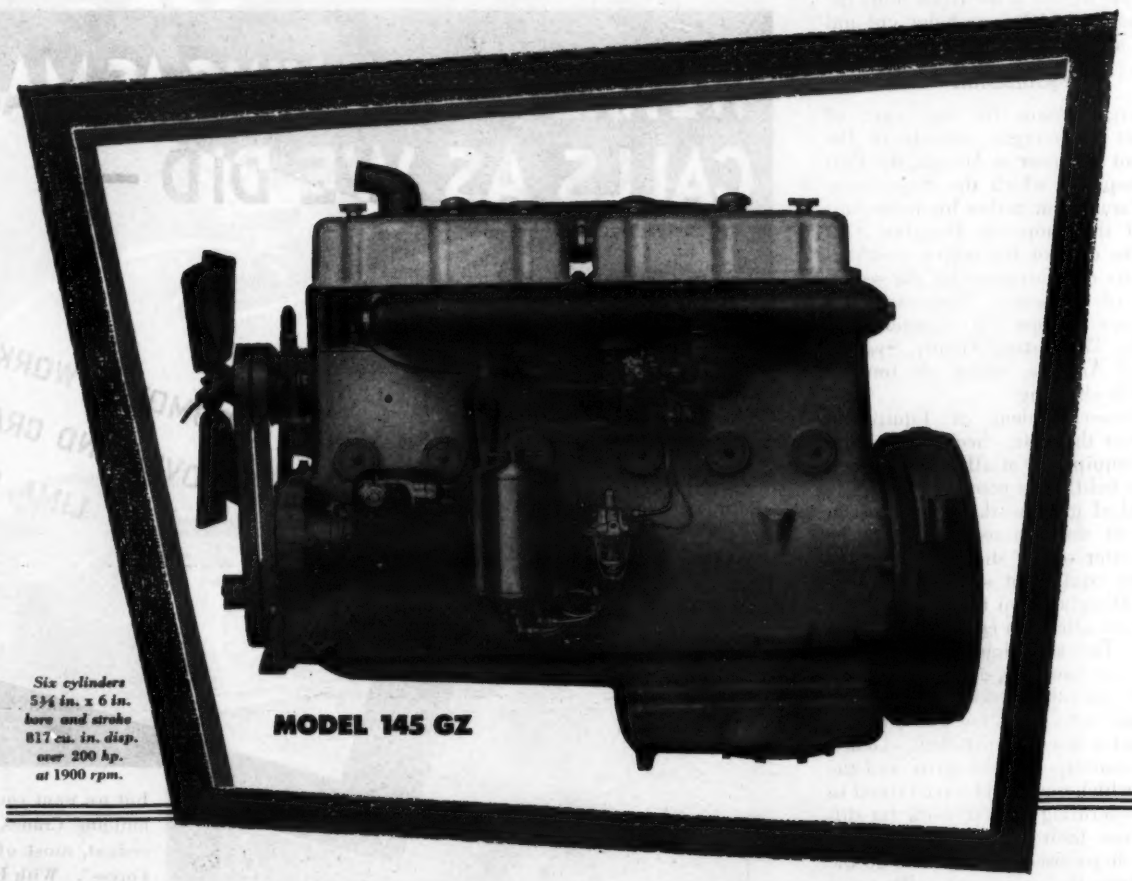
Oak timbers for the demountable barriers on the Duquesne Way, Pittsburgh, Pa., were cut square and to length by a Durex saw rig and then an air auger was used in a jig to bore the holes for the dowels to hold the guard in place in the pavement.

Personnel

The Water Street and Duquesne Way developments were built by contract under the direction of the Board of County Commissioners of Allegheny County, consisting of John J. Kane, Chairman, George Rankin, Jr., and John S. Herron. John B. Sweeney is Director of County Department of Works, with L. B. Duff, Chief Engineer; C. F. Houlihan, Assistant Chief Engineer in charge of design; S. M. Madancy, Road Design Engineer; S. A. Shubin, Bridge Design Engineer; J. S. Devlin, Assistant Chief Engineer in charge of construction; C. K. Harvey, Office Engineer; and H. J. Dickman, Construction Engineer.

A. G. C. Annual Meeting

The Twenty-Fifth Annual Meeting of the Associated General Contractors of America will be held at the Drake Hotel in Chicago February 7, 8 and 9. All members are invited to attend.



Six cylinders 5¾ in. x 6 in. bore and stroke 817 cu. in. disp. over 200 hp. at 1900 rpm.

WAUKESHA ENGINES

FOR: High-Speed Heavy-Duty Trucks and Busses • Tractors • Bulldozers • Fire-Fighters • Logging Equipment • Generating Plants • Centrifugal Pumps • Open Pit Mine Haulage • Oil Field Servicing and Exploration

Look over the list of jobs that this Waukesha Gas or Gasoline Engine will be ready to do for you, right after it finishes its wartime job in heavy ordnance equipment.

It's really rugged! Crankcase and cylinder frame are one unit—a deep sturdy casting of high strength alloy iron. The crankshaft is drop-forged steel, heat treated—with seven 3½-inch main bearings.

The cylinders are wet sleeves . . . made of Molychrome iron. They are easy to remove and easy to replace—for simpler, lower cost maintenance.

A submerged gear-type pump forces oil by full positive pressure to every gear shaft and bearing, while valve tappets and cylinder walls are drenched by oil mist.

A gear-driven centrifugal water pump delivers a large volume of water in directed paths. Large, clear passages around valve seats. Thermostatic by-pass system guards against over-cooling and assures a quick warm-up when engine is started. *Get Bulletin 1186 for dimensions and specifications.*

MORE POWER FOR VICTORY

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS., NEW YORK, TULSA, LOS ANGELES

LOWEST COST FOR HIGHEST DEPENDABILITY

Embury Luck-E-Lite HIGHWAY TORCHES

Comparative, impartial laboratory wind tunnel tests plus road performance under most gruelling conditions prove Luck-E-Lite gives greatest dependability at lowest cost. When you buy Luck-E-Lite you are getting actual predetermined safety.

Embury Mfg. Co., Warsaw, N.Y.

MacDonald Outlines Road Needs of Future

(*Continued from page* 11)

To take up the lag of replacement of our seriously depreciated highway facilities by construction and by heavy maintenance; (2) To be ready to furnish employment through the long-established contract procedures on needed highway projects, as a "stand-by" program. This is necessary to avoid the consternation and inefficiency that are products of a lack of preparedness. These two programs will be accepted as a necessary and sound public policy, since the one is designed dimensionally upon the actual operations of more than a decade, and the second is designed as a stand-by or emergency program, again dimensionally reaching only the number which were employed in the highway field on public works and relief projects during the years when private employment failed to provide sufficient jobs.

Non-Competitive Program

The "stand-by" or employment program as such should be as non-competitive as possible. In order to consider this in the light of our whole transportation scheme, the essential elements of that scheme are given in the table below:

		Mileage
1. Transportation System, 1940		
Railroads (total operated)		246,739
Highways		
Primary state (rural)	329,072	
Other rural	2,674,896	
Total (rural)		3,003,968
Airways		30,913
Waterways (exclusive of Great Lakes)		12,475
Total		3,294,095
2. Annual Passenger Miles, 1940		Passenger Miles
Railroad (total operated)		23,762,359,182
Highways		
Private autos (rural)	244,018,000,000	
Commercial buses (rural)	12,814,000,000	
Total (rural)		256,832,000,000
Airways		1,041,173,558
Waterways (probably largely Great Lakes)		1,317,000,000
Total		282,952,532,740
3. Annual Freight Ton-Miles, 1940		Ton-Miles
Railroads (total operated)		373,000,000,000
Highways (rural)		59,058,000,000
Airways (domestic)		3,469,500
Waterways (exclusive of Great Lakes)		21,651,000,000
Total		*453,712,469,500

*With Great Lakes Waterway and pipe lines included, total is 620,357,768,000 freight ton-miles.

4. Average Length of Trip, 1940	Passenger-Miles	Freight-Miles
Railroads	52.5	351.1
Highways	14.6	17.4
Airways	381.6	554.9

5. Characteristics of Automotive Trips (Passenger cars wholly or in part on rural roads)

	Per Cent		Per Cent
Less than 5 miles	38.4		
5 to 9.9 "	26.5	accumulative	64.9
10 to 19.9 "	20.1		85.0
20 to 29.9 "	6.6		91.6
30 to 39.9 "	2.8		94.4
40 to 49.9 "	1.3		95.7
50 miles and over	4.3		100.0
Trucks up to 50 miles			93.6

In these overall factual data of the pattern of land transportation there are two figures that stand out—the amazing total of passenger-miles and the very large mileage of secondary road travel. If to the passenger-miles of inter-city traffic is added that of city streets, the total rural and urban annual passenger travel is approximately 500,000,000,000 passenger-miles. Applying to this the characteristics of this travel, that 90 per cent of the individual trips fall within the 30-mile limit, the highly local use of highways points the way to the almost unlimited program of highway improvement, within and contiguous to the cities, that is needed but that is non-competitive with other forms of land transportation.

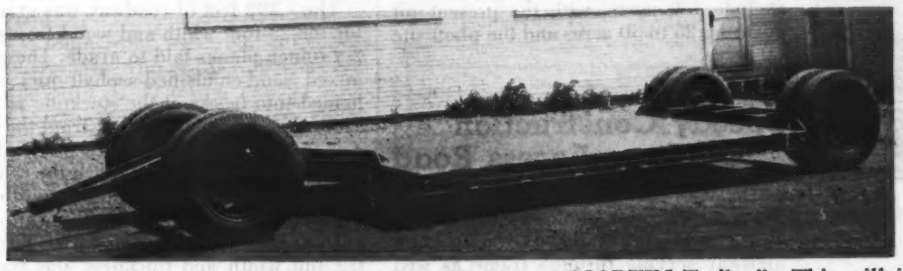
From a paper presented by Thomas H. MacDonald, Commissioner, Public Roads Administration, Federal Works Agency, at the Twenty-Ninth Annual Meeting of the American Association of State Highway Officials, Chicago, Ill., December 2, 1943.

Highways and Autos In War Transportation

Almost two years after the automobile assembly lines were stopped, there now remain about 24,500,000 automobiles in use by private owners, and about another million in storage and in the hands of dealers, a total about equal to the entire supply at the beginning of 1940, Charles L. Dearing, Director of the Office of Defense Transportation's Division of Review and Special Studies, told the American Association of State Highway Officials at its recent annual meeting in Chicago.

This represents a net loss of from 2,000,000 to 2,500,000 cars scrapped during two years of war, since there were some 28,000,000 private automobiles when the war began, Mr. Dearing said. This pool of cars, together with "an unexcelled system of highways and streets", constituted a "personalized transportation system capable of assuming a major role in wartime transportation", he continued, and during the past two years "that role has been performed adequately, efficiently and with a minimum draft upon the scarce materials and manpower so desperately needed for other phases of war effort".

The problem is no longer one of getting out of the mud, but getting out of the muddle.



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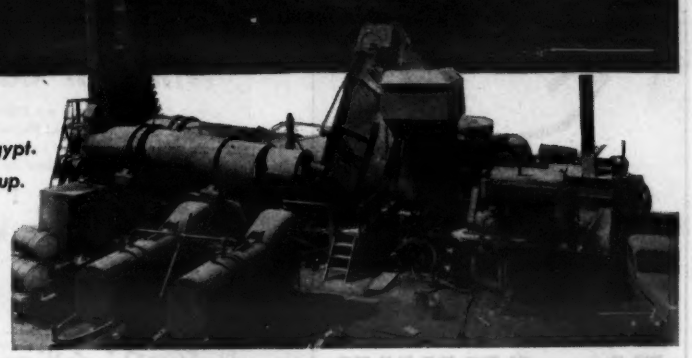


Top, B-G Finisher constructing highway near airport in Egypt. Bottom, B-G Army Asphalt Plant in central plant set-up.

Mobility, America's secret weapon, is winning the war on all fronts. First demonstrated at the Battle of the Marne, World War I, when Paris garrison troops were moved by taxicabs to turn the German army.

Today, Allied motor convoys miles long travel hundreds of miles in a few days—a constantly shifting, hard-hitting force. The German Panzer units of Blitz fame are being out-blitzed on swiftly constructed highways and runways!

The U. S. Army Engineers who make these movements possible use modern construction equipment to build their roads, landing strips and bomber bases right up to the front lines. The same type of equipment that will provide a vast network of roads and airports after the war for civilian mobility—for business and pleasure. 44-1

BARBER-GREENE

AURORA ILL.

"General Ironguts", the first shovel built by the General Excavator Co., is still on the job.

Veteran Excavator Still Going Strong

Seventeen years of service and millions of tons of material to be moved is a big assignment in any man's language, but it means service with merit in the case of "General Ironguts", the first shovel ever built by the General Excavator Co., of Marion, Ohio. And after seventeen years of service, this No. 1 General is still a long way from a "pension", it is reported. When the war came along, instead of retiring, it stepped up its capacity and is working harder than ever to set production records.

For the past four years, this excavator has been working continuously in rock, providing material for a 7½ crusher plant owned by the Scioto Lime & Stone Co., Delaware, Ohio, and has an average daily output of 300 tons. Originally built as a ½-yard machine, the No. 1 General has been stepped up in capacity for the wartime emergency with a ¾-yard dipper.

Emphasizing the rugged construction of this veteran is the fact that age has not served to slow down "Old Ironguts". It is reported that recently it provided twenty truck-loads of rock, at 3½ tons per load, in 65 minutes. Also, lost time for this unit has been less than one day during the past year, its owner reports, while maintenance costs and the need for repair parts have been slight, despite increased demands and the oversize dipper with which the veteran shovel is now equipped.

Scioto Lime & Stone Co. is also a veteran in the field, having been founded in 1899 by James Reaney who is still active in the business and is the father of W. A. Reaney, the present General Manager of the company. Its total holdings include 780 acres, with the present pit covering 25 to 30 acres and the plant site 50 acres.

Speedy Construction Of Navy Access Road

The main gate of one of the Lighter-Than-Air Stations of the U. S. Navy is located a quarter of a mile from the main highway serving through traffic as well as local traffic to a nearby city. To preserve the roadway, an order was issued so that it could be paved as an access road by the state highway department.

The road spreads at the west end to permit easy access to the wide gateway through which all traffic for the Air Station enters. For the work, a total of 3,566.6 square yards of sand-emulsified asphalt from a pair of temporary continuous mixing plants was used. Sand was taken from a local pit, and the plants were operated to produce the mix for a large landing mat at the Station as well as for the access road.

The 1,292 feet of roadway was graded for the 23-foot width and wood forms of 2 x 6-inch planks laid to grade. The premixed sand-emulsified-asphalt mix was loaded into trucks at the stockpile at the Station about a mile distant from the access road by a Barber-Greene loader. The mix was windrowed down the center of the road and then spread to a uniform thickness between the forms by a power grader. After the section had been spread the full width and thickness and traffic was using it continuously, it was opened up each day by a disk harrow and aerated to permit the moisture to escape. This operation was rather fast as the road was laid in hot weather with little rain.

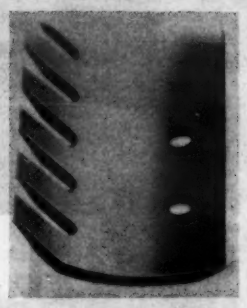
At the end of the curing period the material was laid down by the power graders to grade and a crown of 2 inches in 23 feet. It was then rolled by a 7-ton tandem roller and, for final compaction, by a rubber-tire roller.

The road was given a single surface treatment after the initial mix had been finished, aerated, shaped and placed under traffic for two weeks. Traffic was taken off for two hours while a tack coat of 0.3 gallon of AC-15 per square yard was applied, and 40 pounds of No. 5 slag per square yard was spread by hand, hand-broomed, dragged by a power broom that was not rotated, and then rolled by a 7-ton tandem roller. The slag for this treatment has the following screen analysis:

Passing	1-inch	100 per cent
"	¾-inch	95-100 per cent
"	⅜-inch	0- 15 per cent
"	No. 4	0- 3 per cent

This work was done under the direction of D. D. Hankins, Division Engineer, with George E. Roberts, Resident Engineer in charge of the field work. The contractor was W. C. Shepherd.

SHUNK



What Blade is now doing a grand double job of breaking up ice and packed snow on roads in winter, and scarifying, smoothing and leveling highways all the year 'round?

The answer:

The SHUNK Saw-Tooth Blade

(Attach it to any Grader, Maintainer or Snow Plow.)

The largest exclusive manufacturer of grader, scraper, maintainer and snow plow blades in the world.

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★ DEPENDABLE
★ RUGGED

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Highway Departments Report Much-Needed Reconstruction

Over $6,000,000,000 Required to Rehabilitate 74,885 Miles of Principal Heavy-Traffic Highways

THE American Association of State Highway Officials has made a noteworthy contribution to the information on the condition of our highway transportation system today and what must be done to it to place it in condition for post-war travel. Its recent tabulation of reports from the forty-eight states under the title "Minimum Amount of Needed Construction on Main or Principal Highways as of July, 1943" presents a healthy picture for post-war work, provided plans are prepared in ample time to permit the undertaking of these projects as soon as men and materials are released from the war effort.

Of necessity, much work which would have been programmed for routine improvement has been postponed since 1939, while the deterioration of many miles of highway since that time, due to the impossibility of adequate maintenance, has added thousands of miles to be resurfaced on new bases. Expected greater speed in newly designed automobiles has created the need for flattening many more curves, widening thousands of miles of otherwise good roadway, and the relocation of over 45,000 miles of highway. The summary, as published in *American Highways*, shows that there are 74,885 miles of state, main or principal highways which should be rebuilt, 46,654 miles which should be widened, and 56,927 miles which should be relocated, thereby requiring entirely new construction. This makes a total of 158,466 miles on which construction of some type is essential to safety and economical highway transportation. The estimated cost of this work on the highways is $6,218,393,898.

Of the highway accessories, including drainage structures, guard rail, signs, and bridges, the latter is by far the most important item. The forty-eight states report that there are 30,038 bridges on state highways which should be widened or rebuilt at a total cost of $809,034,848. Taking the work on the highways themselves and the bridges, we find that the total expenditure which is considered necessary as a minimum by the various state highway departments to place our highway system in order amounts to $7,027,428,746.

Highways To Be Rebuilt

Texas, with its far-flung highway system, records the largest number of miles of highways which should be rebuilt, 9,000 miles at a cost of $450,000,000. This is followed by Nebraska with 5,666 miles, Kansas with 4,122 miles, South Dakota with 3,990 miles, Florida with 3,950 miles, Minnesota with 3,500 miles, Iowa with 3,450 miles, and New York and Wisconsin with 3,000 miles each. Of the larger states, New Jersey reports the smallest mileage requiring reconstruction, 103 miles, with Rhode Island the only state reporting less than 100 miles, a mere 60.

There are six states having between 2,000 and 3,000 miles of highway which should be rebuilt: Arkansas, Montana, Nevada, North Dakota, Oklahoma, and Pennsylvania; and seven states with 1,000 to 2,000 miles reported in need of rebuilding: Arizona, Idaho, Indiana, Louisiana, Michigan, Ohio, and Oregon.

Widening Programs

In the tabulation of the state highway mileages which should be widened, Ohio leads with 10,107 miles, followed by Iowa with 4,200 miles, Texas 4,000, New York 3,000 miles, New Mexico 2,738 miles, Louisiana 2,200 miles and Arkansas 2,141 miles. There are eight states with mileages between 1,000 and 2,000 needing widening, namely, Alabama, Colorado, Georgia, Indiana, South Carolina, Tennessee, Virginia, and West Virginia.

Relocation—New Construction

The total of 36,927 miles reported as "should be relocated" means a truly ex-

(*Concluded on page* 61)

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Servicised is the only manufacturer of four different available types of Expansion Joints for concrete construction. These joints are known as: Asphalt Joint, Fiber Joint, Cork Joint and Self-Expanding Cork Joint, and are widely specified in Airport Runways, Dams, Bridges, Highways, Base Pavements, as well as general construction.

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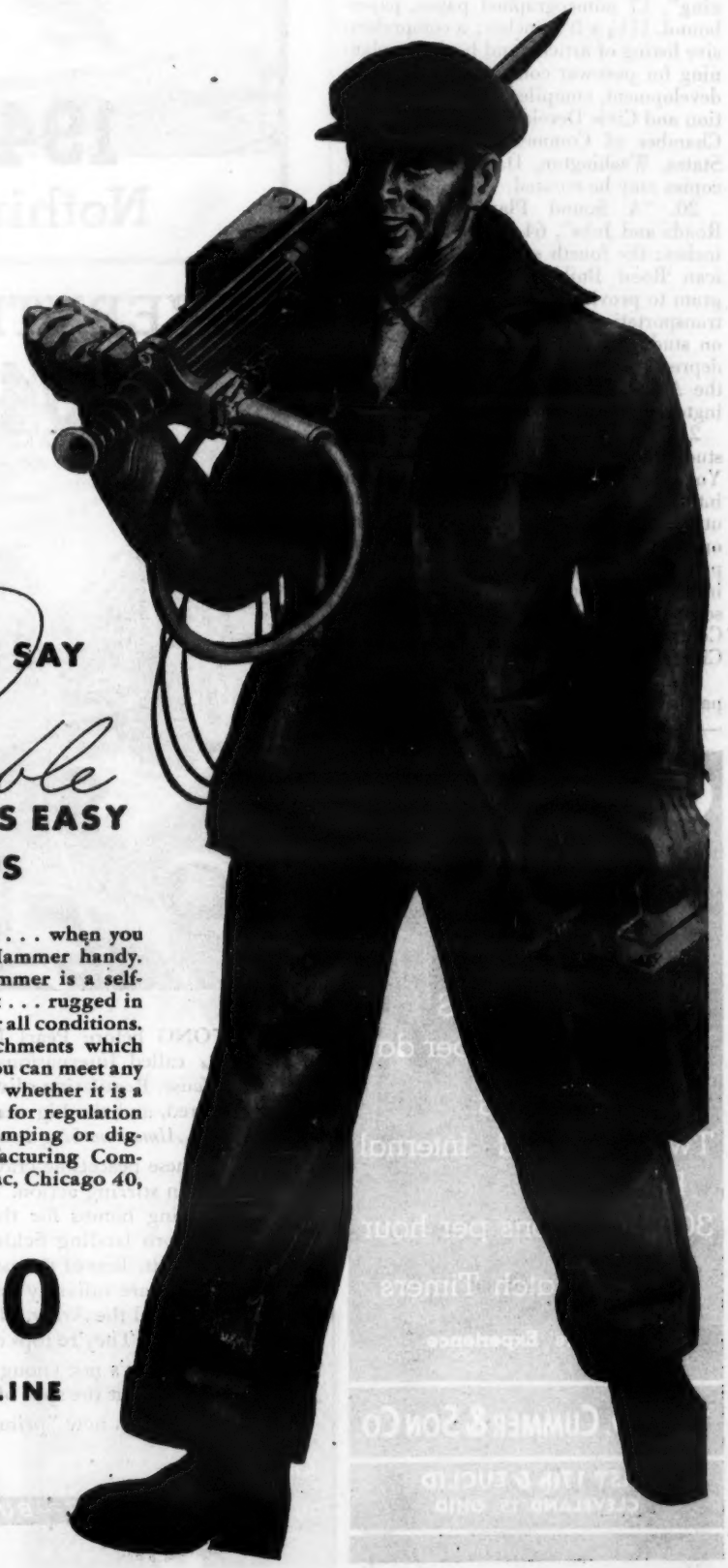

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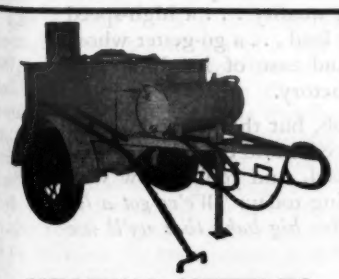

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Fire Proof—Oil Burning
Hand and Motor driven spray. Many sizes. Write for catalog.
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ELKHART INDIANA

The recently completed Chattahoochee River Bridge on an industrial access road northwest of Atlanta, Ga. (See C. & E. M., December, 1943, pg. 1.) This 701-foot 8-inch structure was built by G. L. Strickler of Austell, Ga., whose Superintendent, H. E. Dunn, furnished this photograph.

For Your Post-War File

Continuing our policy of calling the attention of our readers to booklets and pamphlets on various aspects of post-war planning, we list below some additional publications which will be of value in your post-war files. Other such listings appeared in C. & E. M., July, 1943, page 60; September, 1943, page 22; and November, 1943, page 8.

19. "Bibliography on Postwar Planning", 17 mimeographed pages, paper-bound, 11¼ x 8¾ inches; a comprehensive listing of articles and books on planning for post-war construction and civic development, compiled by the Construction and Civic Development Department, Chamber of Commerce of the United States, Washington, D. C., from which copies may be secured.

20. "A Sound Plan for Postwar Roads and Jobs", 64 pages, 10¾ x 7⅞ inches: the fourth edition of the American Road Builders' Association program to provide full employment, better transportation and active markets, based on studies of periods of prosperity and depression. Copies may be secured from the A.R.B.A., 1319 F St., N.W., Washington 4, D.C.

21. "Post-War Planning Now", a study compiled by the staff of the New York Journal of Commerce, based on interviews with key manufacturing executives and government officials throughout the United States; actual peacetime projects already underway in 25 major industries are covered. Copies may be secured from the New York Journal of Commerce, 63 Park Row, New York City, at 25 cents per copy.

22. "After the War—1918-1920", 45 pages, 9⅛ x 6 inches: a study of the military and economic demobilization of the United States after World War I and its effect upon employment and income, made by the National Resources Planning Board, in the hope that such a study would provide light enough on the problem to avoid a repetition of our previous mistakes. Copies are available from the Superintendent of Documents, Washington, D. C., at 10 cents a copy.

23. "Plan Postwar Jobs—Now", 32 pages, 11 x 8½ inches: suggestions by the Committee for Economic Development for industrial planners to help them provide jobs and to provide them when and as needed after the shooting stops. Copies of this helpful booklet are available gratis from the Committee for Economic Development, Field Development Division, Suite 3311, Department of Commerce Bldg., Washington 25, D. C.

24. "Post-War Jobs", 32 pages, 7⅛ x 5 inches: an address by Alfred P. Sloan, Jr., Chairman of General Motors, at the opening fall session of the Economic Club of Detroit. In this discussion, Mr. Sloan analyzes the challenge now confronting the leadership of American enterprise to meet the responsibilities of economic reconversion from war to peace, and outlines his objectives for the post-war era. Copies may be secured from the General Motors Corp., Public Relations Department, 1775 Broadway, New York City.

25. "Postwar Public Works Municipal Handbook", 43 pages, 9 x 5½ inches: an outline of procedure to be followed by municipalities and districts when applying for a state grant for the preparation of plans for municipal post-war projects. Copies may be secured from the New York State Postwar Public Works Planning Commission, Albany, N. Y.

Goodrich Appointments

Announcement of the appointment of Arthur F. Noyes as Truck Tire Manager for the Pacific Coast area, with headquarters in Los Angeles, Calif., has been made by the B. F. Goodrich Co., Akron, Ohio. Mr. Noyes has been with the company since 1927. He will be succeeded on the Akron staff of the Truck and Bus Tire Department by L. H. "Larry" Taylor. H. J. Poole becomes Assistant Manager of the company's Tire Service Department, the position formerly held by Mr. Taylor.

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Up to 1000 Tons per day
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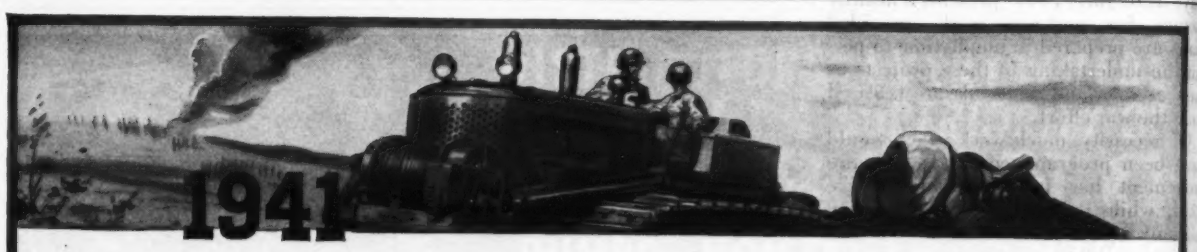

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EVERYTHING changed but the paint

LONG before Pearl Harbor your government called International Diesels to the nation's defense. Regulation olive-drab replaced the familiar red, and the big tractors of industry went to war. *Almost nothing was changed but the paint.*

These peacetime crawlers are writing war history in stirring action. They're pulling big guns, handling bombs for the Air Forces, smoothing shell-torn landing fields, clearing jungles, building roads. Tens of thousands of such International Tractors are valiantly supporting the Marines, the Navy, and the Army. Night and day we're building more. They're tops on every fighting front.

But that's not enough for American resourcefulness under the spur of war.

In 1943 a new "prime mover" rolled from the International assembly lines—a tractor in which *EVERYTHING was changed but the paint!*

Here's a revelation in crawler power, maneuverability and fighting quality . . . a high-speed performer under heavy load . . . a go-getter whose rugged construction and ease of handling will carry far beyond the Victory.

Victory is its one job, but there'll be a world to rebuild later. Then we'll build the International Diesel Crawlers you need. And you'll know why Harvester men are saying today: *"We've got a lot of things packed into this big baby that we'll use when the war is over!"*

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BUY BONDS···BUY MORE BONDS

INTERNATIONAL HARVESTER

Highway Operations Where Autos Started

Howard County, Ind., Where Haynes Built His First Car, Now Strives to Keep Roads Right in Wartime

By EZRA FAY LAMB, Howard County, Ind., Road Supervisor

+ SINCE the beginning of time, man has had the desire to travel from place to place in the world. This desire, plus the necessity to trade, has been the stimulus behind the development of our transportation systems. As time went on, and the means of transportation improved, the demand for better travel routes had to be met.

Because the automobile was first manufactured by Elwood Haynes, a resident of Kokomo, the county seat of Howard County, Indiana, we are particularly interested in the effects of the automobile age, which has necessitated much more careful engineering in the construction of our highways, especially of the travelled way on which all sizes of wheels and weights of loads are used. The early attempts at better highway construction in Howard County involved gravel or stone, or both, combined with the proper grade of tar. We have found this provided a good base when properly drained.

Present-day traffic has declined in Indiana about 51 per cent on a whole, although such traffic as there is is more important than ever before because of its urgency for the prosecution of the war.

Present Road Work

For the duration, we plan to maintain our roads and bridges, but shall carry on no construction, since it is impossible to get skilled labor to do such work. In our maintenance surfacing program, we use 0.3 gallon of 80 to 200-viscosity No. 8 or No. 9 tar per square yard. No. 8 has the same consistency as the old standard TH-1 and No. 9 that of TH-2. The tar is applied by a 1,000-gallon Etnyre distributor with a two-speed rear axle, powered by a Ford C.O.E. engine. This unit was purchased by the county in 1940 and is very adaptable to surface treating, patching, or new construction.

For surface treatment, we use a No. 12 washed gravel screened through ¼ to ⅜-inch openings. In most cases, the road bases were constructed of pit-run gravel to which No. 8 stone may have been added. For patching, from No. 8 to No. 11 stone is used.

Our present aim is to maintain all of our roads in as good condition as possible during this emergency. Several of our gravel roads are in need of additional gravel to bring the surface up to the proper depth and this work is being done along with our regular maintenance program.

The County owns a crushing plant through which pit-run gravel is run and 100 per cent crushed for use in road maintenance. To maintain the gravel roads, 700 tons per mile is distributed on the road through the tail-gates of dump trucks and spread by a multiple-blade maintainer. By using 100 per cent crushed material, no oversize gets on the road, to present a hazard to traffic or increase the maintenance problem.

The Frost-Boil Problem

When Howard County roads are broken up by frost boils, the problem is handled as follows. The material in the frost-boil area is removed to a depth of 24 to 30 inches. The extent of the excavation varies, but if on a hill, it is carried to the lowest point and then to the side ditches. When metal pipe was available, it was installed. At present, 6-inch perforated tile is being substituted, or No. 2 stone, 2 inches in size, will take care of the drainage for several years, until such time as drainage pipe can be secured.

Road Construction

Construction of roads in Howard County has been in accordance with the state highway specifications of Indiana. The standard right-of-way for county roads is 50 feet, with an 18-foot roadway. Many old bases have been reconstructed of pit-run gravel to a depth of 12 to 20 inches. On this, gravel run through the county crusher to reduce it to 1-inch size is placed and compacted. This is usually left without further treatment but maintained for a year, and then surfaced.

The surfacing consists of washed gravel, No. 7 or No. 8, in the amount of 750 tons per mile per inch of depth, with an application of tar that penetrates about 1 inch. This treatment has resulted in about 3 inches of bituminous mat. The tar comes from the Reilly Tar & Chemical Co. in Indianapolis, a distance of only 50 miles from Kokomo, so that it is possible to haul the material by truck if tank cars are not available. The equipment used in preparing this bituminous mat is usually a 12-foot Galion power grader with diesel engine and tandem drive for the mixing operation, and a multiple-blade maintainer pulled by Case tractors.

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Pierce-Bear 2-5 Tons Variable Weights

Engineered for economical operation where the going is tough. Compact, easy to operate. Narrow rear roller gives heavy-duty compression. Built-in water tanks for wet rolling. Powered with Allis-Chalmers Industrial Heavy-duty Model "B" gasoline engine.

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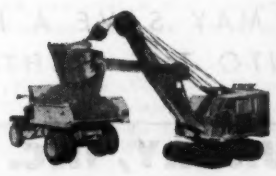

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FROM ¾ TO 35 CUBIC YARDS

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MARIONS have been in the thick of this war establishing production records of their own, both at home and abroad. MARIONS' outstanding achievements during this time, the most trying period of their sixty years of material handling, are proof of the dominant position these machines will hold in the post-war construction program. They will dominate because they more than measure up to the tremendous job ahead.

THE MARION STEAM SHOVEL CO.
MARION, OHIO

Unusual Form Work For Ohio Structure

(*Continued from page 2*)

The north wing walls are 41 feet 3 inches long, and the south wing walls 39 feet 3 inches long. The sidewalks were built monolithic, and cantilevered at the top of the wing walls so as to get in the 3-foot width without widening the structure or stealing from the roadway width. These wing walls are 8 feet 4 inches thick at the footings and 2 feet thick just below the sidewalk. The heights average 28 feet but vary to take care of the 0.48 per cent grade.

The wing-wall footings are cut off on a diagonal at the front to increase the bearing area. In two instances, however, the contractor hit sand pockets in the clay, and the footing had to be thickened from 6 feet to 7 and 7.8 feet and widened 1 foot from the plan to get the required bearing. Excavation methods and the forms for the wing-wall footings were the same as those used for the abutment footing.

Falsework for Span

The falsework for the span consisted of 6 bents of 11 piles each driven to a penetration of 3 to 5 feet below the bottom of the footings. A No. 7 McKiernan-Terry hammer, swung by one of the cranes and powered by a portable 50-hp steam boiler, was used for driving the piles to refusal or to a 22-ton bearing. The 11 piles in each bent were spaced 6 feet 6 inches apart and cross-braced with 3 x 8 planks from alternate piles starting at the ends and bolted to the intermediate pile where the two braces crossed. The bents were capped with 14 x 14 timber to carry the 4 x 12 risers spaced 12 inches on centers. The risers were raised by boards and wedges to form the arch on the underside of the ⅝-inch plywood form.

Wing-Wall Forms

Panel forms of ⅝-inch plywood were assembled on the ground for the wing walls. The panels measured 8 x 30 feet with 2 x 6-inch studs spaced 16 inches center to center and wales of single 4 x 6's spaced 30 inches. These were all built as units on the ground and used repeatedly for the four wing walls with such adjustments as necessary for the variable heights. The forms were erected by one of the Lorain cranes and tied with Star Expansion Bolt form ties. The forms were also stripped by the crane.

Concreting

The aggregates for the concrete were dry-batched at a commercial plant in Cleveland and hauled, four batches per truck, to the site of the job, where five sacks of cement were added per batch. The cement bags were emptied on each batch, but never more than two trucks were permitted to stand with the loose cement on the batches at any one time.

A MultiFoote 27-E paver was set up adjacent to the pour, delivering the mixed concrete to a 1-yard Blaw-Knox Roller-Gate bucket swung by one of the Lorain cranes with a 55-foot boom. Each wing wall was poured as a monolith, using five wooden hoppers mounted at the top of the form and connecting to elephant trunks carried down to the level of the rising concrete. The concrete was mixed to give a maximum 3-inch slump. Water for the paver was furnished by 2 and 3-inch Jaeger Sure-Prime centrifugal pumps.

C. & E. M. Photo

A single bent of falsework for a rigid-frame overpass on an industrial access road near Cleveland, Ohio. One of the completed wing walls of the structure is seen in the background.

The concreting crew on the abutments and wings was organized for pouring regularly 25 yards an hour, the maximum safe concrete load for the wall forms. On the footings, the pours were scheduled and completed on a 35-yard an-hour basis. The deck pours, which ran 355 cubic yards in each half, were organized for 35 cubic yards an hour to

(*Concluded on next page*)

NOT A SCRAPER

A cutting blade, not a scraper, is used on the Burch Truk-Patroll. Many jobs, such as cutting down high shoulders, cleaning shallow drainage ditches and many others, can be done with the cutting blade that could not be done with any other. Hydromotor controlled, with a touch of a finger.

Manufactured by
THE BURCH CORPORATION
Crestline, Ohio
Equipment since 1875

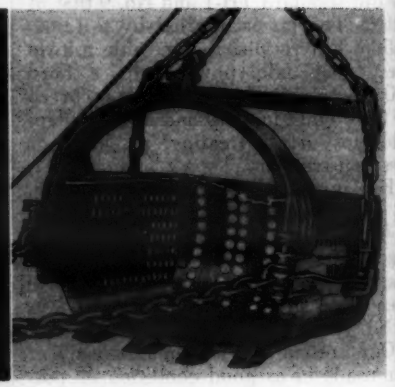
Back the Attack
Buy Bonds

ALL-WELDED CONSTRUCTION

for greater strength and durability

When the HENDRIX Lightweight was conceived, its designer incorporated many outstanding features not found in other dragline buckets. And in their zeal to create the finest product possible, our engineers specified all-welded construction as a worthy companion to the other advantages. Bucket weight is thus saved and greater strength, durability and toughness built in. Manganese steel reversible tooth points, chains and fittings are standard equipment on all buckets in the line.

MANGANESE STEEL
Chains and Fittings
Standard Equipment on all Buckets



The perforations, for which the Lightweight has become famous, are made round and so arranged that the overall strength of the bucket is unimpaired. This decreases the hazard of side-wall cracks. Heavy reinforcing ribs on the bottom and on the curved back are added to give additional assurance of long and efficient trouble-free service. With all excess weight eliminated, the result is a weight advantage over other buckets of from 20% to 40%. This permits the use of large capacity Hendrix Buckets on small machines and on long booms. We'd like to tell you more. Write for descriptive literature . . . or ask your dealer.

Available in three types
Light, Medium and Heavy Duty
⅜ to 20 cubic yards

Also available *without* perforations.

★ ★ ★

YOUR SCRAP MAY SAVE A LIFE!
GET IT INTO THE FIGHT!

HENDRIX Lightweight DRAGLINE BUCKETS

DESOTO FOUNDRY, INC. ★ MANSFIELD, LOUISIANA

Rigid-Frame Overpass Improves Access Road

(Continued from preceding page)

allow completion in 10 daylight hours, with final finishing thus completed before dark.

The concrete crew for the abutments and wing walls consisted of three men emptying cement sacks on the batches, one man dumping the batches at the paver skip, one paver operator, one ground bucket-spotter, one crane man and one oiler, two men spotting the bucket at the top of the forms, two men operating the Jackson vibrators inside the forms, two puddlers who also handled the elephant trunks, and the foreman. A crew of twelve carpenters and four helpers was used to assemble, strip, and set up the forms. Throughout the pouring a Department of Highways instrument crew checked the line and grade of the forms, and the contractor kept two carpenters on the job tightening the forms and checking them constantly throughout the pour.

The forms were stripped the day following the pour to permit immediate start of rubbing. Aquastatic membrane curing compound was sprayed on the back of the wall immediately after the forms were stripped and on the front of the wall as soon as rubbing was completed, to effect a uniform cure by sealing the mixing water in the concrete.

The pouring schedule called for the completion of the north abutment during the week ending May 15, the south abutment in the week ending May 22, with the deck and wing pours the following week. This meant pouring 2,100 cubic yards of structural concrete within three weeks. Except for minor delays caused by continuous heavy rain, this schedule was maintained.

Equipment Used

A Bucyrus-Erie crane with three Lorain cranes, a LeTourneau Carryall, and a D8 tractor made up the dirt-moving and material-handling equipment on this job. A 220-110-volt generator was installed on the job to provide power for the swing saw, electric drills, sander, and vibrators because it was found too expensive to have a power line brought into the job from the nearest transmission line. A Red Star swing saw was used for cutting all of the forms, and a Stanley electric grinder was used instead of hand rubbing on all exposed surfaces of the concrete, and, with a sanding head, for finishing the forms and wood fillers as well as to dress the joints. A Worthington 260-cfs portable air compressor provided power for the hand pneumatic tampers used to compact the backfill around the abutments and wing walls.

Major Quantities

The major quantities for this rigid-frame structure were as follows:

Excavation, structure, unclassified	1,060 cu. yds.
Concrete, Class C, frame	1,250 cu. yds.
Concrete, Class E, wing walls	860 cu. yds.
Concrete, Class E, footings	795 cu. yds.
Waterproofing	487 sq. yds.
Reinforcing steel	151,800 lbs.
Premolded expansion-joint filler, 1-inch	390 sq. ft.
Expansion joint, paving	150 lin. ft.
Sheet asbestos-rubber packing, 1/16-inch	415 sq. ft.
Bridge railing, concrete with timber hand-rail	352 lin. ft.
Fiber conduit, 2-inch	352 lin. ft.
Porous backfill	510 cu. yds.
Bell-and-spigot drain pipe, 8-inch	367 lin. ft.

Personnel

The contract for the access road project, DA-WI-10A(1), of which this rigid-frame structure was a part, was awarded to The Horvitz Co., of Cleveland, Ohio, on its total bid of $1,299,183.42. Al Kohn was General Superintendent, and F. C. Shons was Bridge Superintendent for the contractor throughout the work. H. G. Sours is Director of the Ohio Department of Highways, Robert E. Willems, Division Engineer, and Walter Andersen was Project Engineer for Department on this work.

Every accident helps the enemy. Follow the rules for safety!

New 33-Hp Power Unit Added to Le Roi Line

The newest addition to the line of Le Roi power units, ranging from 2 to 12 cylinders and 4 to 400 hp, is the Model D140 four-cylinder valve-in-head engine with a piston displacement of 140 cubic inches and developing up to 33 hp at 2,400 rpm. The D140 embodies the features typical of other Le Roi engines, including rugged construction, accessibility, and simplicity of design which combine to make a heavy-duty engine which is economical to operate, easy to maintain, and designed for continuous service and long life, the manufacturer states.

Two of the D140's features are the valve-in-head arrangement and wet cylinder sleeves. Others include a drop-forged counterweighted crankshaft, extra-large main bearings, vertical magneto, drop-forged connecting rods, precision bearings, oil-bath air cleaner, valve-seat inserts, full-pressure lubrication, and conveniently located controls.

The new D140 four-cylinder valve-in-head engine.

More details on the new Model D140 power unit are contained in Bulletin D-140, copies of which may be secured direct from the Le Roi Co., 1706 So. 68th St., Milwaukee 14, Wis., by referring to CONTRACTORS AND ENGINEERS MONTHLY.

"D-U-M-M-Y J-O-I-N-T-S"

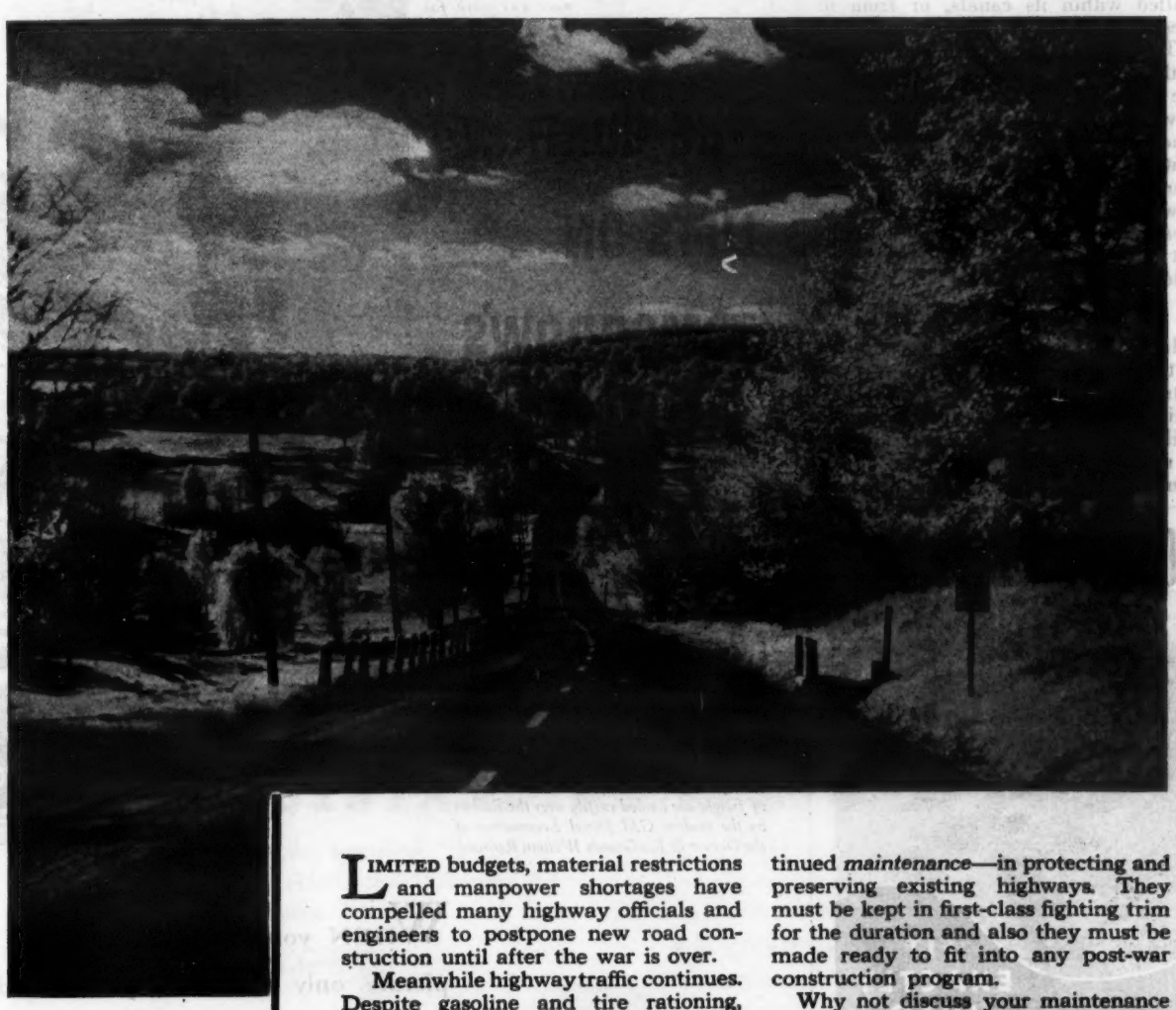
Add life to a concrete road by "lessening" ruptures. They furnish means of expansion for the top portion of the paving. They should be installed at closer intervals transversely. Our installing devices make installation easy.

FLEXIBLE ROAD JOINT MACHINE CO.

WARREN, OHIO, U. S. A.

TODAY'S MAINTENANCE PROGRAMS

ARE IMPORTANT IN ANY POST-WAR PLANS



LIMITED budgets, material restrictions and manpower shortages have compelled many highway officials and engineers to postpone new road construction until after the war is over.

Meanwhile highway traffic continues. Despite gasoline and tire rationing, America's roads are actually wearing out faster today than during peacetime. Truck travel, which accounts for 18 per cent of all the nation's freight, is heavier than ever before — and many, many times more important!

The immediate answer lies in continued *maintenance*—in protecting and preserving existing highways. They must be kept in first-class fighting trim for the duration and also they must be made ready to fit into any post-war construction program.

Why not discuss your maintenance problems with the Tarvia field man? He has at his command all Barrett's 38 years of successful paving experience, and he can show you how Tarvia can be used economically and quickly to repair or maintain almost any type of pavement.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
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Providence . . Rochester . . Minneapolis . . Cleveland . . Columbus . . Toledo . . Youngstown
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Barrett Tarvia*

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ONE OF AMERICA'S GREAT BASIC BUSINESSES

Maintaining Canals In Imperial Valley

Care of Equipment Important In Keeping 750,000 Acres of Irrigated Land Producing Food for America

✦ A FEW days after Pearl Harbor, rumors ran wild in the Los Angeles area that the Japanese intended to starve out the West Coast in a short time by ordering the Japanese-Americans in that region to stop raising vegetables. This, like most of the other rumors which have beset the country in wartime, was untrue, and not only the West Coast but the entire country has found that it depends much more for its produce on that vast market garden some 200 miles southeast of Los Angeles and known as the Imperial Valley.

The Imperial Irrigation District is this country's largest cooperative farming and irrigation enterprise. Headed by Chief Engineer and General Superintendent M. J. Dowd, it supplies water from the Colorado River to more than 750,000 acres of the great southwestern desert, and generates electric power for the farmers by hydro-electric works installed within its canals, or from its diesel-electric plant at Brawley, Calif.

The history of the district is crowded with incidents in the long fight against the rampages of the Colorado River, and it was not until the series of dams, including Parker and Boulder, was built that this threat of flood damage was permanently removed. Flood waters are now stored in Lake Havasu or Lake Mead, and let out at a rate which will not prove detrimental to the country below the dams.

Maintenance Program

In order to irrigate the 750,000 acres in this garden valley, the District faces a tremendous annual construction and maintenance program. Each year it builds many miles of new lateral canals as new lands are opened up to irrigation. Its maintenance of existing canals is a man-sized job in itself and much of the yearly appropriation is spent by the Drainage and Irrigation Department for this purpose.

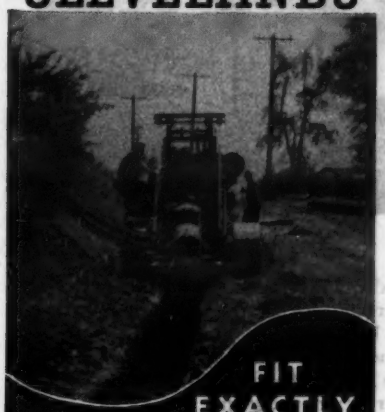
One of the main feeder canals in the Imperial Valley irrigation system, showing one of the service draglines operating as a crane.

Back in the days when the Colorado River flowed naturally up into the valley, it carried quite a bit of silt in suspension; canals filled up; and in a short time their carrying capacity was diminished. Today, the problem of keeping the canals clean is not so much the removal of silt, as desilting works at Imperial Dam takes care of most of that, but of eliminating the nuisance of weeds and moss. This growth along the canals impedes the flow of water sufficiently to cause decreases of as much as 500 to 100 cfs. Where possible, moss is treated by cutting off the flow of water in a canal for a few days, in which case the sun dries and kills it. Weeds are killed by going over them lightly with a portable burning machine which covers from 10 to 15 miles in an 8-hour day. About a week after the initial searing, the weeds die and a second burning finishes them off. Usually two applications each year are enough to keep the weeds down.

For general cleaning and maintenance, small crawler draglines of from ⅜ to 1-cubic-yard capacity are used, as they are mobile and dependable and can clean old canals, dig new ones, and serve as cranes, clamshells or backhoes on a variety of jobs. For example, one Bucyrus-Erie 15-B machine, using a ½-yard Red Arch bucket, has worked a week on excavating a section of new lateral canal, then changed over to a crane for a short time, picking up a check structure and setting it in place, and was then loaded on a trailer and moved 10 miles to another section of

(*Concluded on page* 70)

"CLEVELANDS"



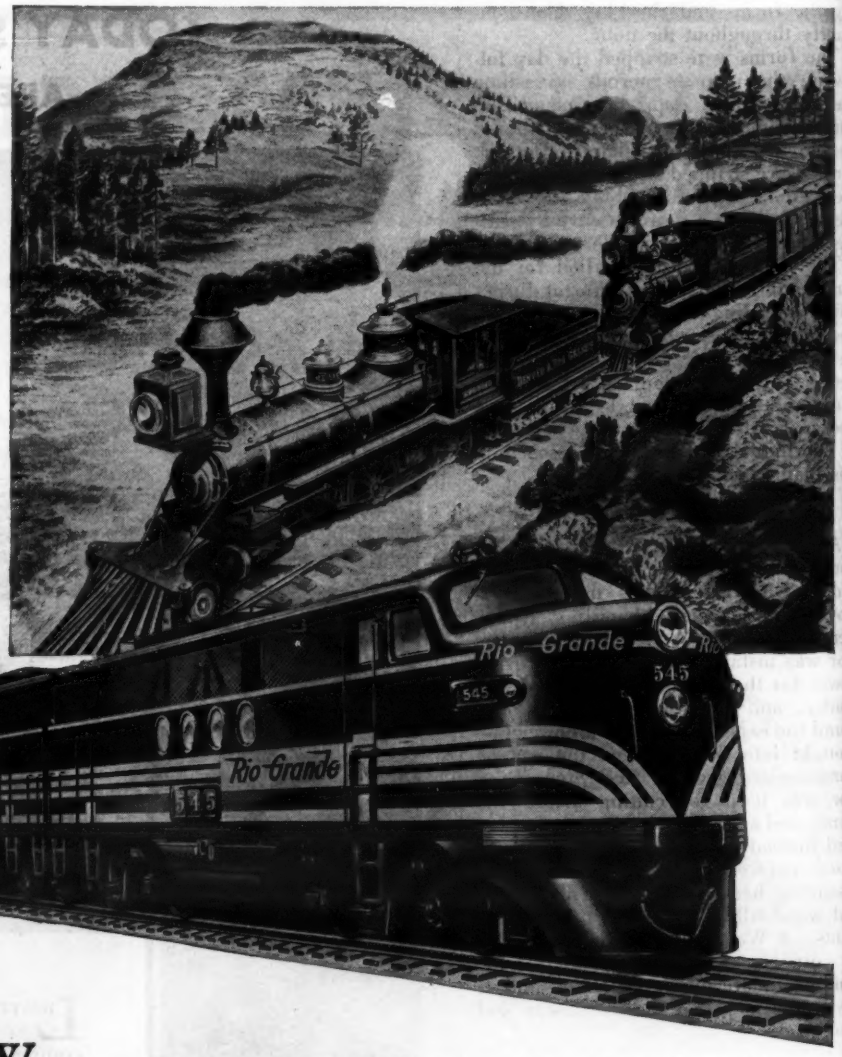
FIT EXACTLY INTO YOUR DITCHING REQUIREMENTS for Oil - Gas - Water - Air Fields - Sewers - Drainage - Building Foundations - Telephone - Telegraph

No matter where you put them, sticky mud, rocky or sandy ground or rough terrain, "CLEVELANDS" deliver Top Performance.... Their correct, compact design, rugged, superior construction, many various speeds and easy maneuverability on full crawler mountings assure maximum ditch at minimum cost.

THE CLEVELAND TRENCHER COMPANY
"Pioneers of the Small Trencher"
3542 ST. CLAIR AVENUE CLEVELAND, OHIO

"Double-heading on old Veta Pass in 1881." Getting a train of four or five cars over this Rocky Mountain pass was work for two of the best locomotives of the time.

THE CURTAIN LIFTS ON TOMORROW'S RAILROADING



Today, long trains carrying thousands of tons of freight are hauled swiftly over the Rockies by the modern GM Diesel Locomotives of the Denver & Rio Grande Western Railroad.

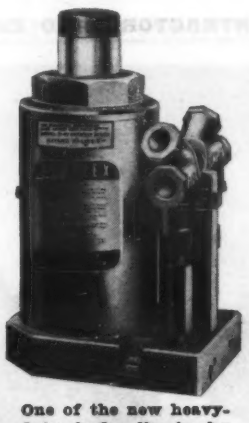
WHEN you think of the Diesel locomotive, don't picture only the sleek, streamlined passenger trains which shorten distance and race the clock. Think too of the mainline Diesel freight locomotives which General Motors builds. These swift, dependable giants of power are contributing heavily to the astonishing war record of the railroads. They are raising the curtain on new standards of transportation keyed to the era which lies ahead.

GM GENERAL MOTORS DIESEL POWER

LOCOMOTIVES..... ELECTRO-MOTIVE DIVISION, La Grange, Ill.

ENGINES....150 to 2000 H.P. CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

ENGINES.....15 to 250 H.P. DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.



One of the new heavy-duty hydraulic jacks recently announced by Templeton Kenly & Co.

New Hydraulic Jack With Tandem Pumps

Moving heavier weights faster is the urgent requirement today, and to meet this need, Templeton, Kenly & Co., 1020 So. Central Ave., Chicago, Ill., has added 30-ton and 50-ton hydraulic tandem-pump jacks to its Simplex line. Up to this time, a 20-ton capacity was the largest hydraulic jack made by this company. These new powerful hydraulics have high and low-speed pumps which can be operated singly or in unison.

The base of the jack is made of special-analysis solid-steel bar stock which adds to the load-bearing security. The jacks have two release valves located on opposite sides of the base for the convenience of the operator. Either release screw controls the return of the ram. An easy carrying grip is an integral part of the high-speed pump. The units can also be carried by two men by simply inserting the jack lever through both pump-handle sockets. The Model 30HJ, which has a capacity of 30 tons, weighs 65 pounds, has a low height of 11 inches and a hydraulic lift of 7 inches. The Model 50HJ has a capacity of 50 tons, weighs 115 pounds, has a low height of 12 inches and a hydraulic lift of 7 inches.

Complete information regarding these new Simplex jacks may be secured direct from the manufacturer.

Glynn County Reports Past and Future Work

The annual report of Glynn County, Georgia, for the fiscal year ending June 30, 1943, has recently been published and summarizes the accomplishments of the Commission of Roads and Revenue under the guidance of H. J. Friedman, Engineer-Director. The County has continued to operate within its budget, in spite of increased costs of labor, supplies, and materials, and the problem of increased services to a population which has increased from 22,000 early in 1942 to approximately 75,000 at the present time.

During the fiscal year covered, the county received $368,354 and spent $289,809, leaving a surplus of $78,545. The county's surplus fund now totals $183,645 purchase value in U. S. Savings Bonds. Under the law, the County Commissioners can make no expenditures involving the use of these reserves without advance public notice of the proposed use, followed by a public hearing at which any taxpayer or citizen is given an opportunity to be heard.

Looking to the coming year, the report states that efficient operation, living within income, and working under the pay-as-you-go plan will continue to be the basic county policy. The post-war program for Brunswick and Glynn County is being actively encouraged and given such financial assistance as is required. All cooperation possible is being given the Georgia State Highway Board in its post-war program for four-laning the Coastal Highway which extends through Glynn County.

A Federal Works Agency project for a modern sewerage system is the chief improvement being sponsored by the County for St. Simons and Sea Island. Another prime objective is the development of the Inland Waterway and the Port of Brunswick, while the location of new industries is being encouraged through cooperation with the Industrial Committee of the Board of Trade.

Equipment Maintenance By Means of Arc Welding

Another timely contribution to current literature on welding, "Maintenance Arc Welding", has just been published by the James F. Lincoln Arc Welding Foundation. The second book to be developed from the 1940-42 Industrial Progress Award Program, this volume is the first on maintenance welding to be published by the Foundation and is based on twenty-five of the most significant award papers in the program's maintenance classification. It is brought out at this time in the hope that it will be found useful in keeping equipment and plants in operation, despite critical shortages in materials and equipment, by describing the use of arc welding in reclaiming broken and worn parts and the application of welding in the fabrication of replacements.

The contents of this 234-page volume are arranged in twenty-five chapters covering the subject by industries, although frequently the solution of a maintenance problem in an unrelated industry can be adapted to the more immediate problems of equipment care and repair in the highway and heavy-construction field.

Copies of "Maintenance Arc Welding" may be secured from the James F. Lincoln Arc Welding Foundation, Box 5728, Cleveland, Ohio. Price: 50 cents per copy postpaid anywhere in the U. S.; 75 cents elsewhere.

MONDIE DROP and UPSET FORGINGS
FOR CONSTRUCTION EQUIPMENT
Such as Dipper Teeth, Trencher Teeth, Gear Blanks, Levers, Tie Rods, Cranks, Crank Shafts, Special Shapes, etc. Forging weight range from 1 to 50 pounds.
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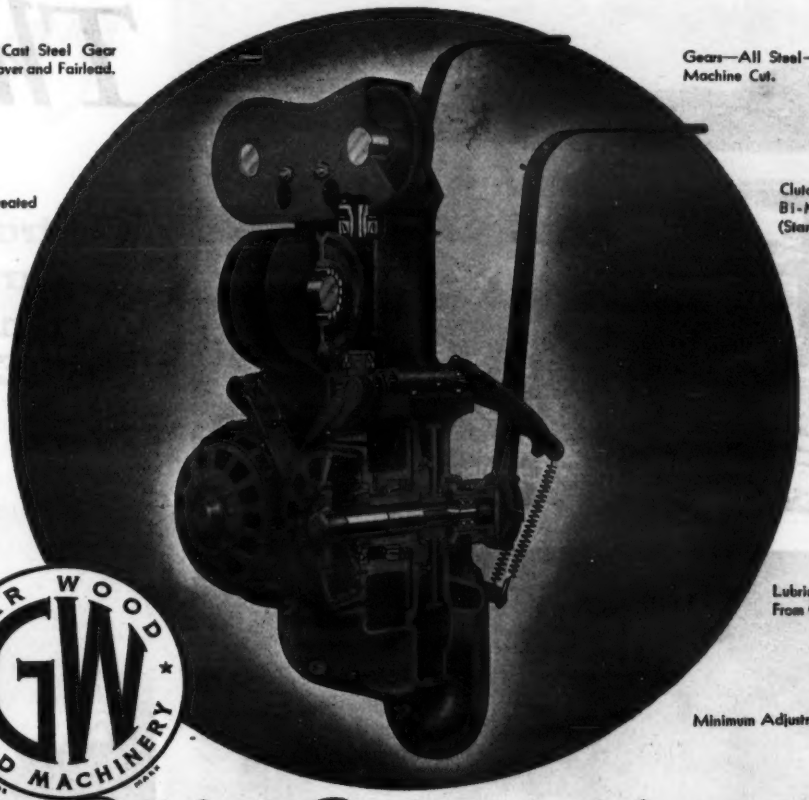

Heavy Cast Steel Gear Case, Cover and Fairlead.
Gears—All Steel—Machine Cut.
All Shafts Heat Treated and Ground.
Clutch—Cone Type with Bi-Metallic Facing (Standard Equipment).
Bearings—Ball and Roller.
Brake—Servo—External Band Type—Low Drag.
Large Sheaves.
Ventilated—Clutch and Drum.
Lubrication—Automatic From Gear Case.
Minimum Adjustments.
GAR WOOD GW ROAD MACHINERY

Cable Control Units
GIVE OUTSTANDING PERFORMANCE

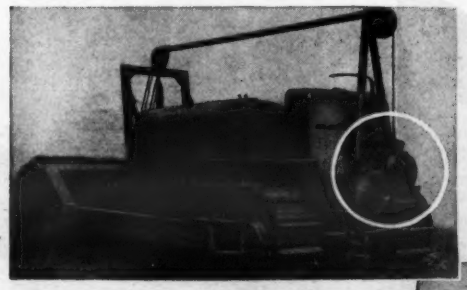
Features provided in the simplified "Clean-Cut" design of Gar Wood Cable Control Units make this "top" performance possible.

GW Road Machinery operated by Gar Wood Cable Control Units is a component fighting unit in the United Nations' drive for Victory!

SPECIFICATIONS

Cable Capacity (½"—6 x 19) Per Drum	185,
Line Pull—Bare Drum	7500 Lbs.
Line Pull—Full Drum	4530 Lbs.
Line Speed—Bare Drum (1-2-5 Trans. Gear)	270 Ft. Per Min.
Line Speed—Bare Drum (3-4-6 Trans. Gear)	433 Ft. Per Min.
Line Speed—Full Drum (1-2-5 Trans. Gear)	477 Ft. Per Min.
Line Speed—Full Drum (3-4-6 Trans. Gear)	718 Ft. Per Min.

The GW Road Machinery Line is Complete—Consisting of both Hydraulic and Cable-Operated Units



Gar Wood Bulldozer operated by SINGLE-DRUM Cable Control Unit.

Gar Wood earth-moving Scraper operated by GW DOUBLE-DRUM Cable Control Unit.

BONDS SPEED VICTORY

ROAD MACHINERY DIVISION
GAR WOOD INDUSTRIES, Inc.
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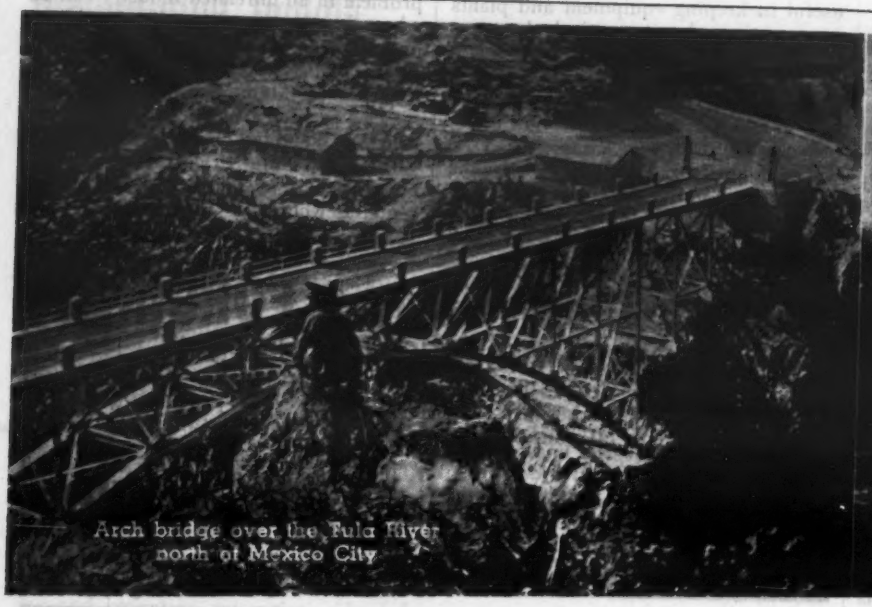
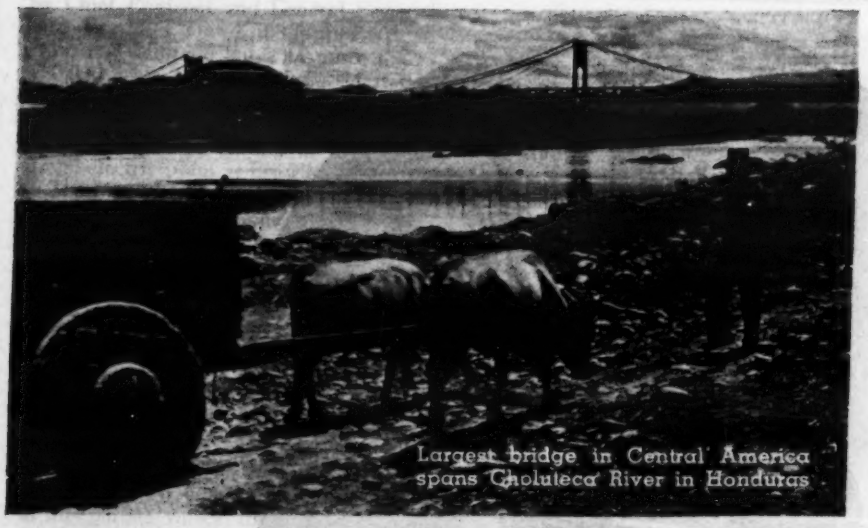
GW ROAD MACHINERY is Sold Through ALLIS-CHALMERS Dealers Everywhere



Arch bridge over the Tula River north of Mexico City



Largest bridge in Central America spans Choluteca River in Honduras

The Pan Amer

Central and South American Countri Carry on Construction of Route to Link the Americas; United States Equipment Aids in the Work

Building the Simon Bolivar Highway in Venezuela near the Colombian bo

Building the Inter-American Highway in Honduras

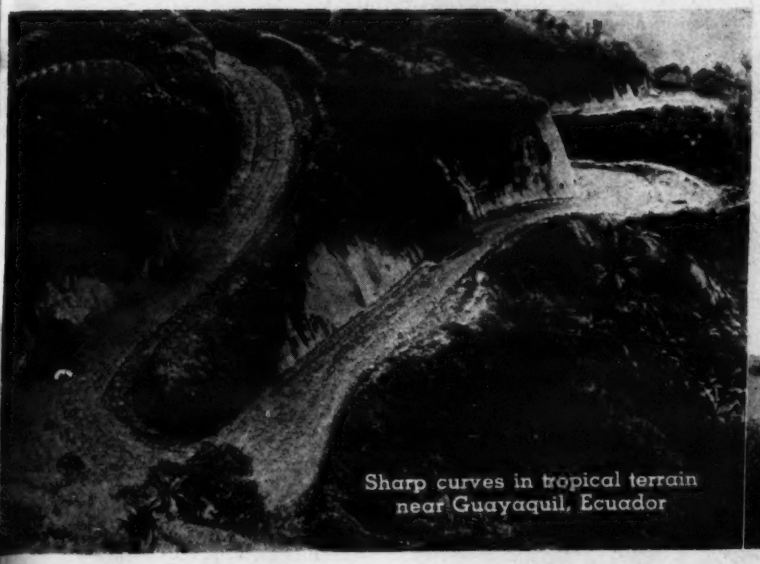
A paved section near Santiago, Chile

Hand-set stone base near San Marcos, Guatemala

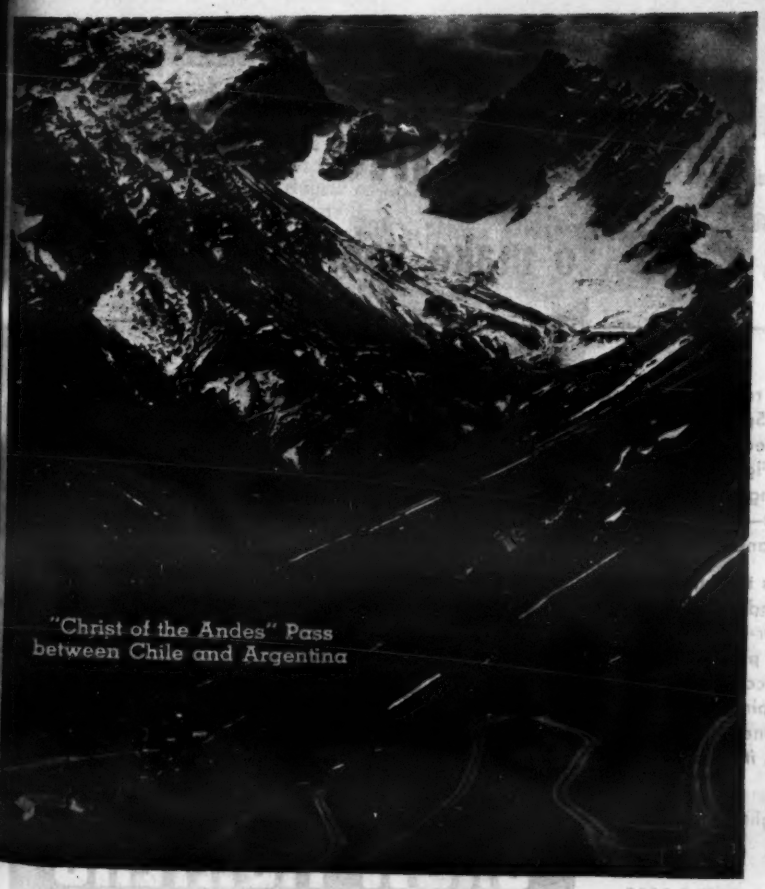
Guatemalans men working out their annual road tax

ne can Highway

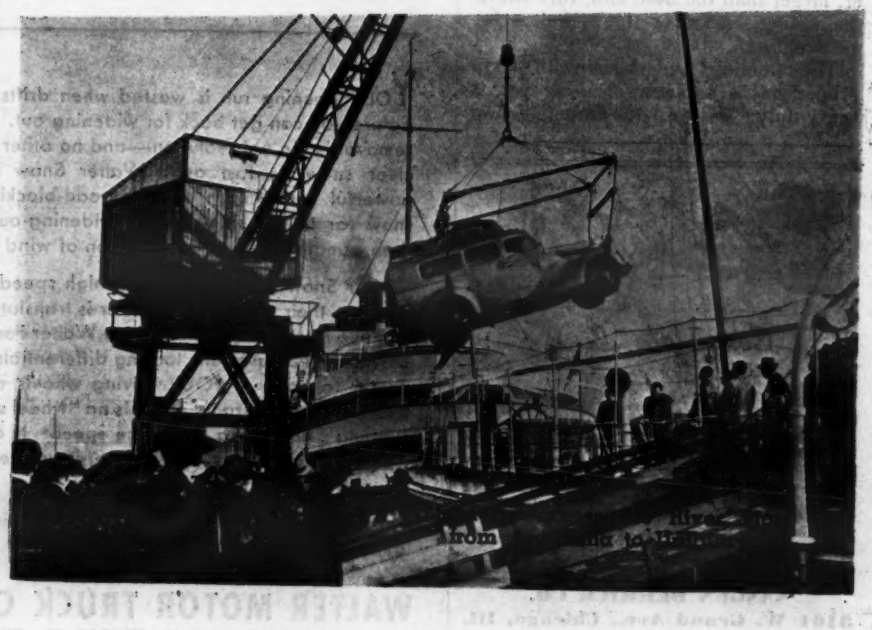
Modern equipment working near Ayutla in Guatemala



Sharp curves in tropical terrain near Guayaquil, Ecuador



"Christ of the Andes" Pass between Chile and Argentina



Well-Equipped Shops Serve Well in Wartime

(*Continued from page 37*)

pan or pans for each machine. It is the unwritten law in the shops that every usable part must be salvaged from a tractor which is being overhauled or is junked. At the far end from where we started our inspection is a Tomlin-Harris 100-ton hydraulic track press and a small Manley mechanical press.

Just outside the building is one of the explanations of the efficiency of all the work that is done by the men in this shop. A covered pit with a heavy anchor and a series of I-beams well-lubricated and under water has been built for running-in every tractor after it has been overhauled. The tractor is put in this pit and run for a full day to try to bring out any weakness in the engine or other rebuilt parts. It is possible to use this pit for tractors with or without grousers. The latter cannot be taken out on the road, as so much of the state highway is of asphalt, and so the "in place" test is far more satisfactory than waiting until the tractor is out on the job.

Carpenter Shop

In a separate building adjacent to the tractor shop is the carpenter shop for rebuilding seats, truck bodies, and cabs for graders. It has a roller conveyor under a swing saw for cutting heavy timber that can be handled and cut to dimension before being shipped to the field. A band saw, a rip-saw table, and a large and a small planer complete the equipment in this large shop. All of the units, except the swing saw and the band saw, are driven off a jack shaft, and those two have separate electric-motor drives.

Blacksmith Shop

In a large storage room just outside the blacksmith shop we found a heavy power shears, a press for removing solid tires from wheels, and stored here temporarily was a Ford truck with a sheet metal top, a tool box sunk into the truck bed, and at the front of the body a P&H-Hansen electric welder, an air compressor, an electric generator for lights, and a double frame for holding oxygen and acetylene cylinders. The welder, compressor, and generator are all run by a power take-off from the truck engine by a selective clutch.

In this same section the welders were building a new electric-welding truck for work in the field. On the flat bed of a Dodge 1½-ton truck they were mounting another P&H-Hansen electric welder, larger than the first, and, forward of the welder, racks for the cylinders for gas welding.

The welding and blacksmith shop proper has a radiator cleaning vat, a heavy-duty Wilson 400-ampere shop welding outfit, a bar bender, sheet shaper, drill press, emery wheel, forge and anvil, tire bender for the old steel tires for wooden wheels (we may be using them again soon), and a work bench with an acetylene-welding outfit. Next to this is a metal welding bench with a shield for electric welding. There are also pots for melting and pouring bearings for tractors.

Facing this is the storage and paint shop, where equipment is painted by a DeVilbis spray paint gun. The room for this work is equipped with a large exhaust fan to remove the excess paint fumes. The outer parts of the shop are used for the temporary storage of materials that move rapidly.

Truck Shop

The truck shop, within which is located the remarkably well-equipped machine shop, is 150 x 50 feet in plan and is adjacent to the warehouse. The truck shop is equipped with monorails near the walls, with 1-ton chain hoists. A Canton Foundry rolling floor crane aids in moving truck engines and other heavy parts about the shop. A locked tool room contains a large supply of heavy twist drills, dies, reamers, and special tools.

The machine shop contains the largest variety of equipment we have seen up to the present in any one highway-department shop. Others may have had as large an assortment and had the stock depleted by Government requisitions, but Georgia still has, and is using to good effect, a very large variety of machine-shop equipment.

The equipment starts off with the lowly but highly important power hack saw, then a large special boring mill, two Landis crankshaft grinders, a radial drill, a Chicago Pneumatic shop compressor, two Niles-Bement-Pond drill presses, a Landis grinder and sander, a Landis piston grinder, a Black & Decker valve refacer, a boring bar for cylinders, a Heald cylinder-grinding machine, a Greenerd arbor press, a buffer and grinder, a No. 2 Cincinnati milling machine, a Cincinnati shaper, and a Norbom Engineering Co. boring bar which has proved itself invaluable in these times. The lathe equipment in the machine shop is enough to make a good machinist's mouth water, and if any read this and want to use any of these, they just have to apply, as the East Point Shops are lamentably short of both mechanics and machinists. The lathes include: a 16-inch x 10-foot Lodge & Shipley lathe, a 20-inch x 6-foot American Tool Works lathe, a Universal 24-inch x 10-foot

(*Concluded on next page*)

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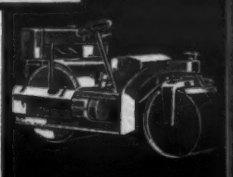

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YOUR opening run is wasted when drifts refill the road before you can get back for widening out. Speedier snow removal is the only solution—and no other equipment can clear snow as fast as a Walter Snow Fighter. These powerful units smash through road-blocking drifts—hurl snow far to the side—speed widening-out—prove more than a match for any combination of wind and snow!

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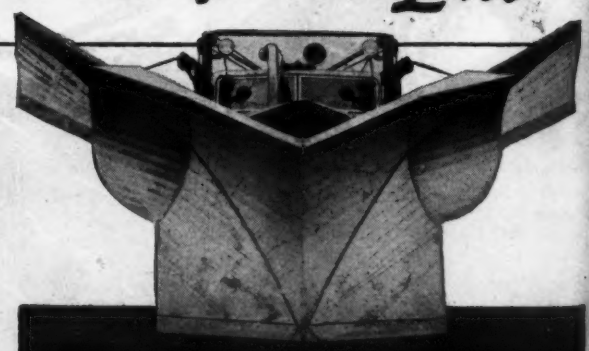

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Complete Line
of
DERRICKS
and
WINCHES

SASGEN DERRICK CO.
3101 W. Grand Ave., Chicago, Ill.

Georgia Equipment Is Well Maintained

(*Continued from preceding page*)

lathe, a 20-inch x 5-foot American Tool Works lathe, a 12-inch x 5-foot Carroll-Jamieson lathe, and a 12-inch x 3-foot Willard lathe.

The shop machinists have made a series of gear pullers out of tool steel to fit various sizes of gears, and these have saved much time and energy. In the middle of the shop is a stand for running-in all rebuilt tractor engines. It has a gas engine for driving the rebuilt units, which are run on the stand for a half day. A smaller stand nearby is used for truck engines which are run under their own power.

Electrical Shop

At the end of the truck shop farthest from the machine shop is the electrical shop, where every electrical part that goes into tractors and other power equipment is overhauled and rebuilt. The sole electrician now working in the shop has a metal work bench with a large cabinet for his tools and parts. The equipment includes a small drill press, a buffer and grinder, a magneto tester, a carburetor test stand with a gasoline tank in a closed circuit, a 110-volt motor-generator set for remagnetizing magneto magnets, a General Electric Tungar battery charger, a Weidenhoff condenser tester, a Weidenhoff magneto-winding tester, an armature tester, and a Champion spark-plug tester.

Adjacent to the electrical shop is the oil room, from which all lubricants used in the machine shop are dispensed.

Steam Laundry

Outside the machine shop, under a roof that protects the men from rain or sun, is a complete steam laundry for cleaning equipment. It consists of a horizontal steam boiler, a divided wood ramp for the truck or other piece of equipment being cleaned, and a combination steam and air jet for the steam cleaning process. Alongside there are three sheet-metal vats into which baskets of parts are dunked by a crane running on a monorail overhead. These vats contain a heated solution of Oakite and caustic soda which removes grease and dirt in short order.

Warehouse

The warehouse located at the same address in East Point was formerly the offices of the State Highway Board of Georgia. Now it is used for receiving and dispensing highway stores for the entire state, and issuing parts and materials on requisition to the Douglas Shops. The warehouse is operated under separate supervision from the Shops which must issue their own requisition for needed supplies.

In separate rooms which once were offices and drafting rooms are now stored tractor parts in one room, hand tools in another, another has new signs, and still another general supplies. In the main section on the first floor is a large rack with a good store of tool steel, steel shafting, etc., with a conveyor roller on which the heavy steel can be moved to a power hack saw which cuts off just the length requisitioned.

In the office a perpetual inventory is maintained, showing all incoming stock and the issue by requisition number and date and the balance on hand. This Kardex file is located immediately behind the desk of the Warehouse Superintendent so that in an instant he can check the stock of any item in the warehouse. Parts and materials are billed monthly to the shops, according to the job number on which the requisitions were issued.

The next task is to try to replace the part or material that has been used. That is the heartache of any stock man today. A few months ago, in the midst of a heavy program of bridge replacement, the Department was threatened with a depletion of its stock of wire nails, a very necessary item in wood-bridge maintenance. The state was scoured, and stock was sought in the open market to no avail, when finally a source of old square-cut nails was found, and several carloads were purchased. They proved to be even more satisfactory for nailing bridge floors against the impact of heavy truck and bus traffic than the usual wire nails.

Personnel

G. T. McDonald is State Highway Engineer of Georgia. R. D. Osterhout is Equipment Engineer of the State Highway Board, operating under the direction of M. L. Shadburn, Chief Maintenance Engineer. W. S. Mooneyham is Superintendent of Equipment, with headquarters at the East Point Shops, which are operated by W. R. Wiley as General Foreman. W. A. Hemrick is Superintendent of the Douglas Shops and R. E. Hope is Superintendent of the East Point Warehouse.

Regular lubrication with good lubricants is the major factor in long equipment life. So choose your greases carefully; use them regularly.

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Stationary type gasoline engine driven welders are complete as shown, ready for mounting on skids or your own portable chassis. Include heavy-gauge sheet metal housing, roomy storage cabinet that locks. Engines are equipped with battery ignition, battery, starting motor, charging generator. Automatic "slow down" brings engine up to speed when arc is struck, causes drop to idling speed when welding ceases.

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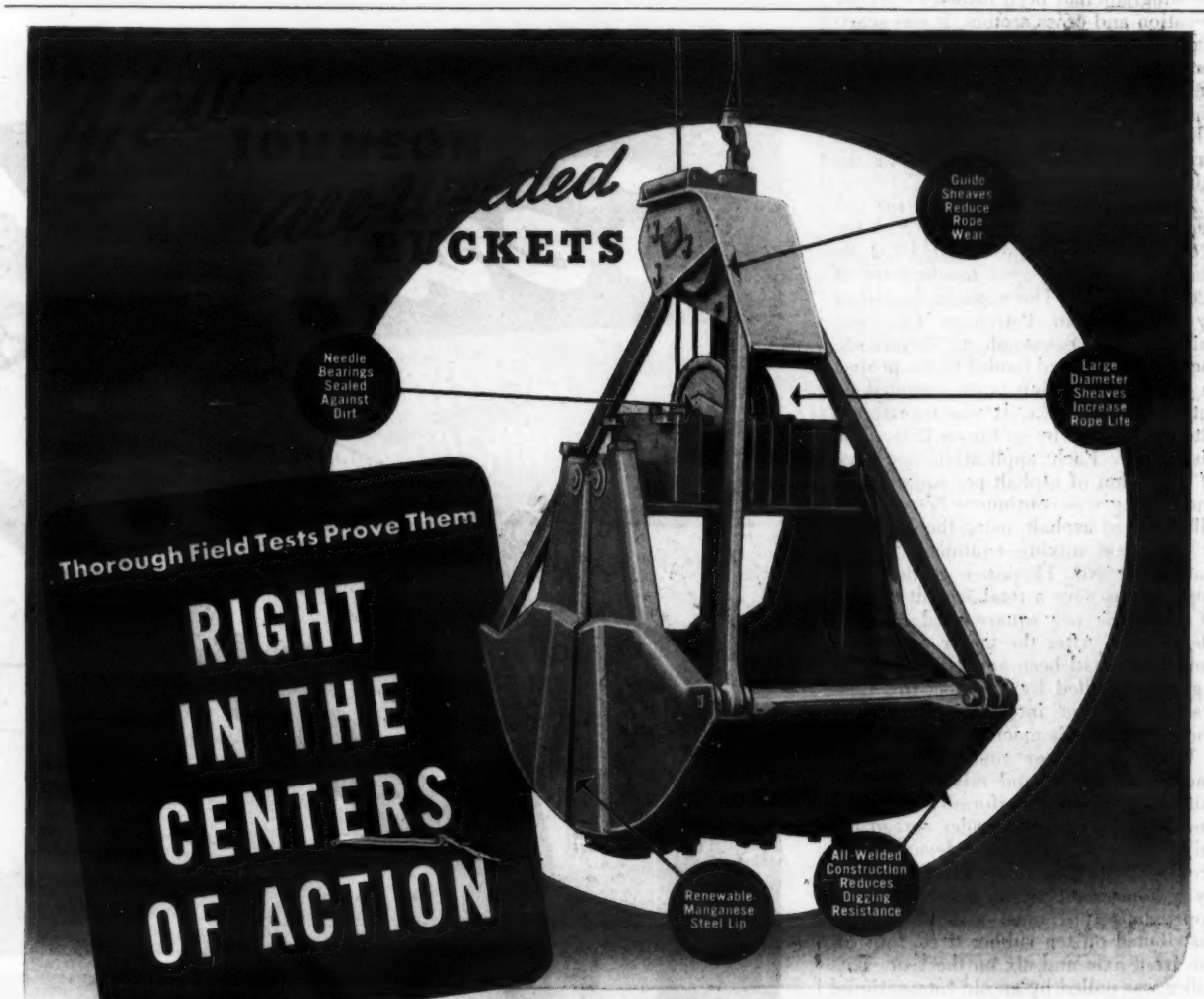
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RIGHT IN THE CENTERS OF ACTION
Renewable Manganese Steel Lip
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● Here's a bucket that's designed to get things done . . . built to give extra yards of economical digging at a mininum cost.

It's all-welded construction eliminates power-wasting bolts and rivets . . . provides greater stability through proper weight distribution.

New and exclusive Johnson features give this streamlined bucket efficiency-promoting and life-prolonging advantages in all centers of action. For example, guide sheaves replace conventional rollers . . . greatly reducing cable wear. To reduce wear, needle bearings, (protected against dirt by special synthetic rubber seals) are used instead of bronze bushings, on all closing sheaves.

A renewable lip edge bar, of durable manganese steel, gives greater digging efficiency and many times the life of the ordinary steel lip construction.

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Rehandling	½ yard to 2½ yard capacity
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Small Surfacing Job Built Economically

River Bridge Approaches Surfaced Efficiently As Adjunct To Large Structure; Used Power Mixer

✦ A SMALL quantity of mixed-in-place sand-asphalt base with single surface treatment was completed, during the autumn of 1943, on the approaches to the South Altamaha River Bridge near Darien, Ga., by the Scott Construction Co. of Thomasville, Ga.

The project consisted of approach surfacing at both ends of the new bridge, which had been constructed by the same contractor. The subgrade, also put in as part of the principal contract, was of sandy material which made excellent aggregate for the proposed sand-mix. After the subgrade had been bladed to proper elevation and cross section, it was scarified and plowed 10 inches deep by a Case 3-share bottom plow pulled by an International TD-6 TracTracTor. Additional grade preparation was done by Oliver spring-tooth harrows and disk harrows which were also used in the mixing and curing operations.

After the moisture content of the soil had been sufficiently reduced and the proper pulverization obtained, RC-2 asphalt was applied at a temperature of 120 degrees F. The asphalt, furnished by the Mexican Petroleum Co., was shipped from Savannah, to Brunswick, there unloaded and hauled to the project in three 1,000-gallon tanks mounted on International trucks. It was transferred into and applied by an Etnyre 850-gallon distributor. Each application consisted of 0.3 gallon of asphalt per square yard and mixing was continuous between applications of asphalt, using the previously described mixing equipment and a Caterpillar No. 11 power grader. The applications gave a total asphalt content of 5 gallons per square yard of completed base. After the major portion of the asphalt had been applied, an Ariens Aggmixer pulled by a rubber-tire Case tractor was put into use and mixing completed by this machine.

When the proper amount of asphalt had been applied and mixing had obtained the desired uniformity of color, the Caterpillar power grader spread the mixed material to proper elevation and cross section. The surface was then rolled by a home-made traffic roller weighing approximately 7 tons, with the weight distributed on ten rubber tires, four on the front axle and six on the rear. This roller was pulled by an old International truck which had been rebuilt in the contractor's shop, having had the frame shortened and the wheels changed to use automobile tires, two in front and four on the rear axle. Rolling was continued until the 10 inches of loose material had been compacted to a thickness of 6 inches. Blading by the power grader was continuous during the rolling operation.

C. & E. M. Photo

The 850-gallon Etnyre distributor used for the road-mix on the approaches to the South Altamaha River Bridge on U. S. 17 in Georgia. Additional pavement width was shot by hand spray as shown.

A single-course surface treatment was then applied, using 0.4 gallon of asphalt and 40 pounds of slag per square yard of surface. The slag ranged in size from ¼ to ¾ inch. The asphalt was applied by the Etnyre distributor through a 22-foot spray bar, at a temperature of 325 degrees F. Additional width of pavement at the ends of the bridge was sprayed with a hand spray from the same distributor. The slag was applied by a Buckeye spreader box immediately after the application of the asphalt and the completed surface was rolled immediately by a 5-ton Galion tandem roller.

Personnel

This surfacing work was a part of the contract for the construction of the South Altamaha River Bridge, awarded to the Scott Construction Co., Thomasville, Ga., by the State Highway Board of Georgia. The work was under the personal supervision of E. W. Ellis, Senior Bridge Resident Engineer for the State and Donald Thomas was Superintendent for the contractor.

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Dig Ditches Faster —

with the Koehring Pull Shovel—because of lighter weight—longer reach—better vision—greater strength. Deep or shallow trenches are dug with equal speed and efficiency. Exceptionally high hoist line speed gets the loaded bucket out of the trench. Quick and easy dumping "gets rid of the dirt." All operations are faster, increasing production to a new "high." Easy steering and moving in tight spots, accurate boom control, stable operation, and quick moves on or between work locations are Koehring advantages. Koehring Pull Shovels are easily and quickly convertible to shovels, cranes or draglines.

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KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Fleming Urges Need For Post-War Planning

(*Continued from page 27*)

must be shipped to help feed and clothe the destitute of Europe for many months, continuing shortages of these two items at home may be expected.

In short, prosperity is not lurking just around the corner this time, either. As yet there is in sight no miracle by which to conjure our customary abundance. Prosperity after this war can be created only by the toil and sweat of the American people spread over many months or years.

Public Works and Progress

The public-works program advocated by Major-General Fleming is for the short run. It would be designed to assist recovery by helping to hold employment steady after demobilization while private industry is getting set to resume its traditional role as the employer and provisioner of the people. It cannot fulfill that role unless government, Federal, state and local, has its detailed plans ready for useful works before the war ends. And these detailed plans must include, in addition to working drawings, the specifications, the rights-of-way and site acquisition, and the contract documents.

Highways, whether of gravel, concrete or steel rail, or routes of communication by water, have shaped the destiny of America and will continue to do so. Zane's Trace, the Santa Fe Trail, the Oregon Trail, the Erie Canal, the Union Pacific pushed back the wilderness and made America very largely what it is today. When traffic is diverted from one direction to another, new values are created, and some other values disappear. Highways have a profound effect on the growth and development of towns and cities. They can stimulate growth here, or stunt growth there. Good highways have built cross-roads communities into thriving cities, and they have just about wiped out other towns. So the highway planner needs to approach his task in a prayerful attitude. He is building not only for the present but for the long future, and thereby helping to shape the coming pattern of our civilization.

Prepared from a paper presented by Major-General Philip B. Fleming, Administrator, Federal Works Agency, before the American Association of State Highway Officials, Chicago, Ill., December 1, 1943.

Statement on Standards For Fire Extinguishers

Because of a certain amount of confusion concerning the distinction between fire extinguishers bearing standard Underwriters' Laboratories approval and those bearing the Laboratories "EAS" approval, a statement clarifying the situation has been issued by the Safety Research Institute, New York City.

Standard approved extinguishers bear the usual Underwriters' Laboratories label, which reads "Underwriters' Laboratories Inspected", and gives the serial number of the label and pertinent information on the classification of the extinguisher. That label signifies that the unit conforms to the Laboratories' "pre-war" specifications covering types of materials, details of construction, performance requirements, etc. Such extinguishers are now available only to very high-priority holders.

When the war started, restrictions on the use of critical materials made it necessary for the manufacturers of standard extinguishers to develop new models using non-critical materials. The solution to this problem was undertaken in cooperation with Underwriters' Laboratories, and a realistic decision was made to sacrifice durability in favor of performance.

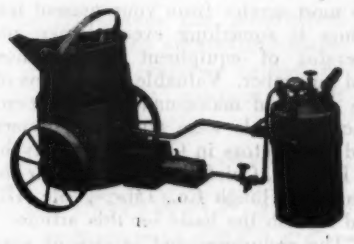
"Emergency Alternate Specifications" were developed which permit the use of substitute materials, and extinguishers produced under these specifications bear the "EAS" approval label; that is, the Underwriters' Laboratories inspection label has the letters "EAS" added and also the year of manufacture. This label signifies that the unit on which it appears will perform as well as the standard model, but will require more careful maintenance and cannot be expected to resist corrosion or stand up as long as the standard type.

When standard equipment is once more obtainable, the "EAS" approval will be withdrawn. "EAS" extinguishers now available include the pump-tank and foam types. Many of these are going to priority holders, but some are being released for general civilian service.

Both labels are intended as indications to insurance inspectors of the degree of protection the equipment affords an occupancy, and serve as comparable indications of reliability to the owner or prospective purchaser.

CONNERY'S HEATING KETTLES

Speed up work by using a Connery Heating Kettle for building and maintaining highways, airports, barracks and roads. Made in sizes of 30, 80, 110 and 165 gallons.



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Bottom: 880 Senior Dual Crusher Gravel Plant.
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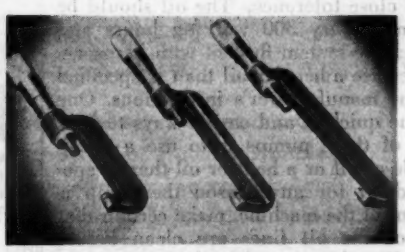
CRUSHED rock and gravel—in tremendous volume—is essential ammunition in the present war. Roads must be built in days instead of months, and concrete structures must literally spring from the ground. The speed with which this work is done is a typical case of American-built equipment giving important advantages over the enemy.

On every front, Universal crushing plants and rock and gravel crushers have speeded up the work. On the Alaska Highway, on South Pacific islands and elsewhere, they have established production records and functioned faithfully with minimum maintenance, so important in emergency construction. On the home front, Universal crushing equipment has done its share in the rapid building of access roads, runways and other military installations.



Universal is also producing pulverizers for fertilizer and explosives plants, and we are making a direct contribution to the war effort in the production of army ordnance equipment which we have been called upon to build. At right are gages made in our toolroom for use in producing precision parts in our shops.

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CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

Care and Operation Of Tractor Shovels

Some Suggestions on Maintenance, Use of, and Trouble-Shooting for, Tractor-Mounted Excavators

✦ IN these machine-less days on the home front, when it is well-nigh impossible to secure equipment or replacement parts for civilian uses, how to get the most service from your present machines is something every owner and operator of equipment should know and remember. Valuable suggestions on the care and maintenance of front-end tractor shovels were given to salesmen and distributors in Chicago recently by P. H. Lash, Chief Demonstrator for the Frank G. Hough Co., Libertyville, Ill., and furnish the basis for this article.

"The endurance and service of your shovel depend largely on the start it gets in life," Mr. Lash said. "It has been our experience that most of the troubles encountered with tractor shovels have been due to the failure to prepare the machine properly before it is put to work."

Starting a New Unit on the Job

In case anyone is lucky enough to have a new tractor shovel to start off on a job, we pass along Mr. Lash's suggestions for the treatment of a new machine. First, the cables should be checked to be sure that the bucket is raising evenly, and that all the cable clamps are tight on the cable. Check the oil level in the reservoir while the bucket is resting on the ground, being sure that the oil flows out of the petcock in the reservoir. Be sure to have a good grade of SAE-10 oil in the hydraulic system.

The next step is to lubricate the machine thoroughly, making sure that the pump-shaft bearing and all of the sheaves are greased. Oil the camshafts and cams that release the bucket latches and coat the guide frame sides, wear strips in front of the guide frame, and the booms where they enter the side tube, using a good grade of grease for external use, such as that used on the sticks of dipper-stick shovels.

After this, check all the capscrews, bolts and nuts on the entire unit. Be sure they are all tight and none have been lost in transit. When this has been done, your shovel is ready to go to work.

Maintenance in Service

After your tractor shovel is put into operation, its care and maintenance are the determining factors on just how much work you will get out of the unit and what your cost of operation will be. It should be remembered that, on hydraulically operated shovels, the pump and valve of the hydraulic system are precision-built and are assembled with very close tolerance. The oil should be drained every 300 working hours and the entire system flushed with kerosene. Never use a heavier oil than is specified in the manufacturer's instructions. One of the quickest and easiest ways to ruin one of these pumps is to use a cheap grade of oil or a heavier oil than is specified. If for any reason the pump is taken off the machine, make certain that all of the oil lines are clean before coupling them up when the pump is reinstalled.

A noisy pump suggests one of two things wrong. The intake oil line to the pump may be plugged, not allowing enough oil to flow to the pump. This is sometimes caused by the intake hose collapsing, but in most cases, the cause has been traced to pieces of paper, old rags, or sludge in the system, closing the intake line so that not enough oil can get to the pump. Or perhaps the proper oil level in the reservoir has not been maintained. Check this daily.

Watch the hoisting cables constantly for wear, and keep them adjusted so that the bucket is always level when raised. It is good practice to replace the cable as soon as you notice that the fine wire strands are beginning to break. If this is not done, the worn cable will break when you are transporting or lifting a load in the bucket. In addition to the hazards to human life from an accident of this type, it can cause considerable damage to other parts of the machine, such as bending a piston rod, breaking sheave axles, and springing the boom assembly.

Lubrication

It is important to lubricate the un daily in accordance with the manufa turer's instructions and, of course, che it daily while you are lubricating it, make sure that all bolts and nuts a tight and that the boom tie rods a

(*Concluded on page 71*)

SPEEDY UNLOADING and REHANDLING

The world has been amazed at the unprecedented speed at which our troops are landed and casualties evacuated to hospitals.

Impressive too, is the remarkable speed with which Owen Buckets operate—taking capacity grabs of material quickly and discharging them speedily—handling great yardage at lowest cost.

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MANUFACTURING PLANTS utilize ring-connected Bowstring roof trusses to achieve economy and large areas of clear floor space. For this 210'x280' building, Timber Structures prefabricated and erected 26-105' trusses.

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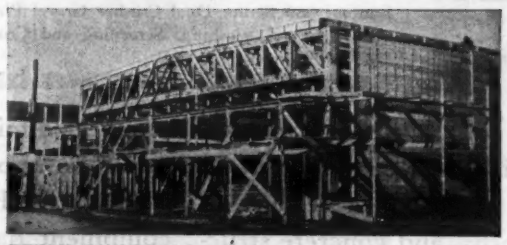
...BUILD WITH TIMBER STRUCTURES

OUR organization has been working with contractors, engineers, architects since the thrifty 30's. The business rule then is a good business rule now—*build well and economically.*

Wood, properly designed, fabricated, assembled and erected has achieved both of these objectives. Our experience has proved time and again that timber trusses and heavy framing provide a logical answer to reasonable building costs for structures of varied types and sizes in many major industries.

In addition to economy, products of Timber Structures have the advantages of strength, permanence, ready source of supply. Whether your construction plans are immediate or post-war, our experience is at your disposal. Inquiries are welcomed on the use of wood or other structural materials. Booklet on typical Timber Structures jobs is yours for asking.



RETAIL BUILDINGS such as this one for Safeway Stores, are economical to build, rapidly erected, long lived. For this 57'x 100' building, trusses were designed for 10 lb. dead load; 40 lb. live load; 10 lb. ceiling load; and erected on the forms before concrete side walls had been poured. Architect: Barrett & Logan. Contractor: Knott, Rogers & Dunbar.

WAREHOUSES call for utility plus economy. This structure for International Harvester Co. is 188'x265'; called for 32-62' roof trusses. Engineer: Sam Murray. Contractor: General Construction Company.

Use of Teco timber connectors utilizes full structural strength of lumber by spreading the load on joints over entire cross-sections of the wood.

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"Complete Highways" Object of Planning

Factors of Safety, Utility, Economy And Beauty Must Be Considered in Design of Post-War Highways

ONE of the major parts of the post-war program will involve highways which must be planned for both permanency and utility, or what might be termed a "complete highway". A "complete highway" must be designed and built around the basic factors of utility, safety, beauty and economy. Past experience and research have proved that landscape practices form an integral and important part in each of these factors.

Probably the most important factor is that of utility, for unless a highway is serving in a useful capacity, its value is limited. In the broader sense, utility means service, and as such includes ample provision for the handling of all types of traffic, with adequate safety turnouts, waysides, parking facilities for school and commercial buses, services for the distribution of mail, milk, and farm products, as well as elements that result in the enhancement of land values.

Safety factors are essential to eliminate all actual or potential hazards and provide for safe and orderly movement of both pedestrian and vehicular traffic. Attractiveness, or the harmonious integration of engineering, architectural and landscape techniques, is necessary to produce both pleasing and long-lasting qualities, which are equally important to the land owner and to the motoring public. Economy, the last but not the least factor, must provide maximum service at relatively low construction and maintenance costs. Developed roadsides contribute to each of these basic factors.

In referring to the "complete highway", attention is not necessarily focused on the super-highway, the freeway or the parkway, for these basic qualities should be intergrated into the design and construction of every road, whether it be local, county, state, inter-state or international.

It is now clear, after a decade of trial and error, that roadside development cannot be effective until landscape principles and roadside practices have been made an integral part of the total design and not something applied as decorative or non-essential to the utilitarian design. The time has passed for resorting to piecemeal corrective measures at the end of construction or during maintenance operations. This practice has proved much more costly than provision to incorporate good roadside practices in the initial construction plans. The "complete highway" must be the product of the teamwork of professional men with special training and experience in engineering, soil science, architectural and landscape design which has been developed, and to some degree perfected, on parkway and freeway types of highways in metropolitan areas. These outstanding examples of urban facilities point the way for the "complete highway" throughout the United States. While all post-war highways cannot be parkways, they can be planned to utilize the advanced principles used in parkway design.

Thus, the concept of the "complete highway" is far-reaching, involving the continued research and coordination of traffic needs with scenic and aesthetic values.

From the Report of the Committee on Roadside Development of the Highway Research Board at its Twenty-Third Annual Meeting in Chicago, Ill., November, 1943.

The entire state highway system of this country has been rebuilt 1½ times in 18 years. We have a national highway system, so in the future the job is rebuilding it by widening, strengthening the pavement, eliminating unsafe curves, improving the shoulders, and some relocation where improvement of the existing highway cannot be done economically. More engineers are coming to the belief that new location is the only answer for the improvement of heavy traffic highways which need to be dualized.

For ease of assembly and speed of installation of expansion and contraction joints,

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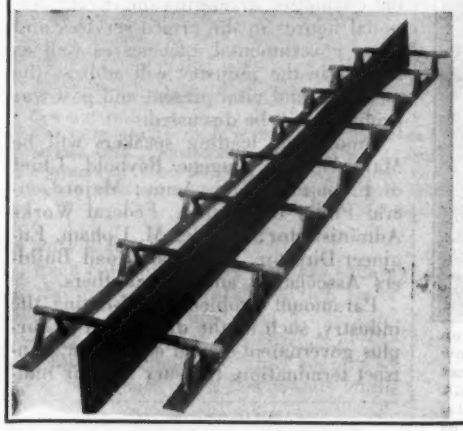

It brings extra profits to the *contractor* by reducing installation costs to a minimum;

also saves the *government* money by eliminating maintenance expense caused by inaccurate alignment of dowels.

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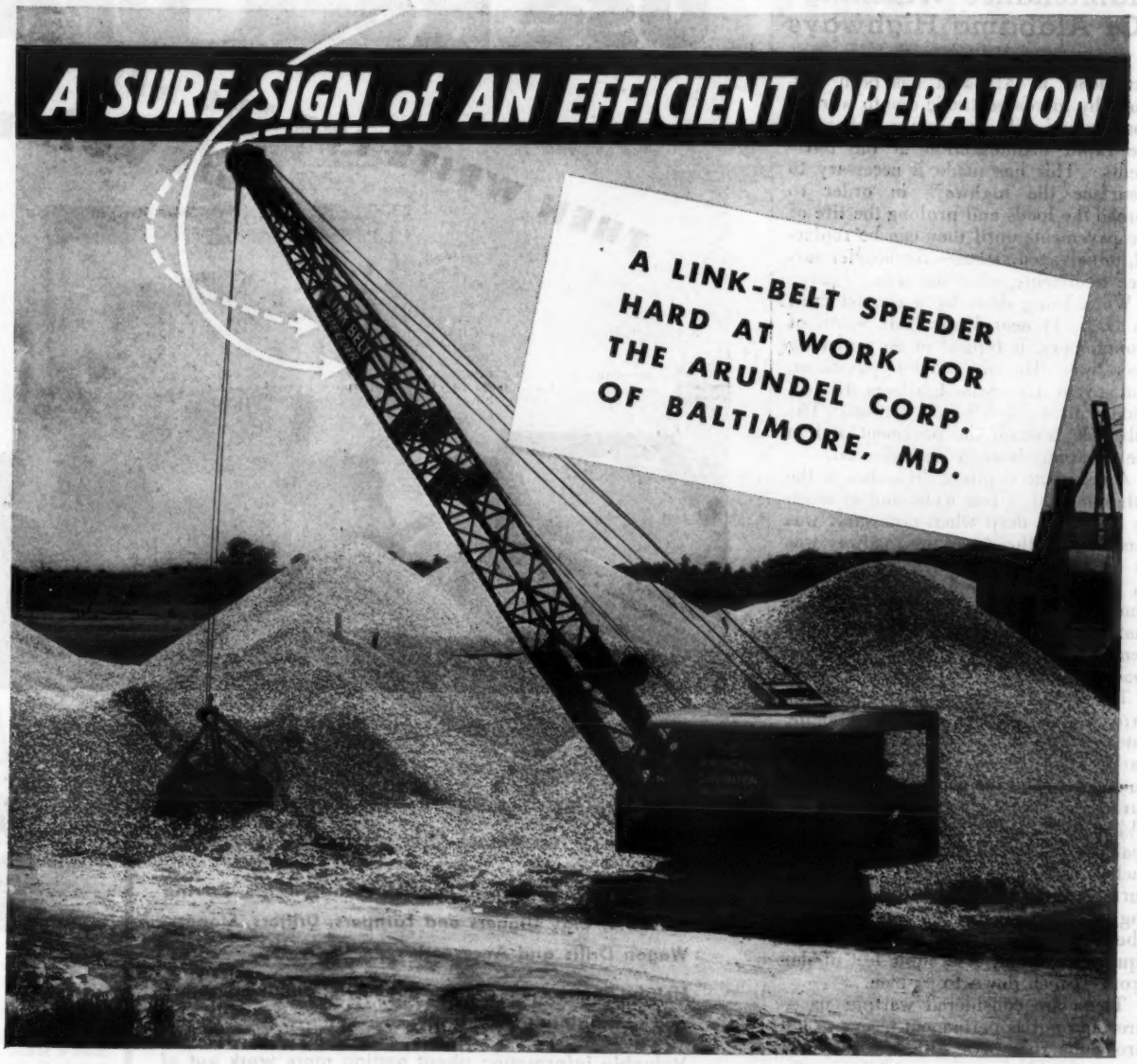

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Costa Rica, anticipating the completion of the Inter-American Highway, is now building roads to connect with that major artery. Here a LeTourneau bulldozer on a D6 tractor, owned by Sociedad Rojas y Cortes, is at work on one of those roads near San Carlos.

Maintenance Widening Of Alabama Highways

The need for widening many 18-foot pavements in Alabama has been hastened by increased traffic due to war industries and military posts as well as by the rapid disintegration of the pavements. This has made it necessary to resurface the highways in order to spread the loads and prolong the life of the pavements until they can be replaced, or salvaged as bases for heavier surface treatments, after the war.

Work being done by a convict crew on U. S. 31 near Hope Hull, south of Montgomery, is typical of the widening operation. The old concrete pavement, laid 13 to 15 years ago, was 18 feet wide with a 9-6-6-9-inch section. The subgrade beneath the pavement and in the shoulders is an A-7 plastic soil.

A minimum depth of 10 inches of the subgrade soil, 4 feet wide, and as much as 20 inches deep when necessary, was removed for the 2 feet the roadway was to be widened on each side. The soil so removed was replaced with a like amount of compacted clay-gravel base material rolled to 100 per cent Proctor density by the dual pneumatic tires of loaded trucks.

The new widening base course was primed with RT-2 to 4 or MC-1 at the rate of 0.27 to 0.30 gallon per square yard. Then the entire surface of broken concrete and the widening strips were surfaced with a light penetration course 1¼ to 1¾ inches thick, choked and sealed to a total thickness of 2¼ to 2½ inches, using slag aggregate; or a single surface treatment may be used, consisting of a tar prime, an application of about 0.4 gallon of hot asphalt per square yard, and 0.42 cubic feet of slag from ¾-inch down to ⅜-inch.

These are considered wartime measures and not as permanent means to improve the roadways, although they can be continued very economically for future resurfacing projects.

On the Fighting Fronts

The job being done by construction equipment on the fighting fronts all over the world is shown pictorially in a recent issue of Caterpillar Magazine. Here Caterpillar tractors and allied equipment are seen aiding in troop landing operations, building roads and airfields, hauling vital supplies, pulling equipment out of the mud, and furnishing electric current.

Copies of this interesting booklet, Form 8084, may be secured by those interested direct from the Caterpillar Tractor Co., Peoria, Ill. Just mention this item.

AED Silver Seminar Will Meet Jan. 17-20

The Silver Seminar of the Associated Equipment Distributors, scheduled for January 17-20 at the Edgewater Beach Hotel, Chicago, will probably be the largest in attendance and the most completely "down-to-earth" meeting ever held by the organization, according to the committee arranging the event. National figures in the armed services and other governmental agencies as well as leaders in the industry will address the meetings, and vital present and post-war problems will be discussed.

Among the leading speakers will be Major-General Eugene Reybold, Chief of Engineers, U. S. Army; Major-General Philip B. Fleming, Federal Works Administrator; Charles M. Upham, Engineer-Director, American Road Builders' Association, and several others.

Paramount problems confronting the industry, such as the disposition of surplus government-owned equipment, contract termination, treasury and tax matters, and post-war business prospects will be discussed in the panel sessions.

An historic exhibit showing photos and other mementos of the early days of the industry is being arranged by R. S. Patten, Regional Director.

Ed. P. Phillips of Richmond, Va., is President of the Associated Equipment Distributors; G. W. Van Keppel, Kansas City, Mo., is First Vice President; H. O. Penn, New York City, Second Vice President; W. W. Bucher, New York City, Treasurer, and C. F. Winchester, Washington, D. C., Executive Secretary.

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LEADERS IN DRILLING EQUIPMENT

County Causeway Project For Post-War Completion

War Restrictions Cause Postponing of Bridge and Fill Connection with a Pair of Keys off Miami

+ CONSTRUCTION of the Rickenbacker Causeway from U. S. 1 at SE 26th Road, Miami, Fla., to Virginia and Biscayne Keys across Biscayne Bay from Miami, was started by Dade County, Florida, before the war but, after considerable progress had been made, was finally stopped for the duration by WPB order. The causeway starts at U. S. 1 with a long approach fill to the shore, then the 662-foot West Bridge of concrete-pier and deck construction to pass the tide and small boats, a 3,745-foot dredged fill, a 3,457-foot bridge of similar construction to the West Bridge but with a two-leaf bascule across the channel, another fill of 7,882 feet to and across Virginia Key, and finally the Bear Cut Bridge, 2,090 feet in length, to Biscayne Key.

Three contracts for this Causeway were awarded in 1940 as follows:

1. Dredged fill and bulkheads, Arundel Corp., Baltimore, Md., $630,505.

2. Bascule bridge, Read Construction Co., Miami, Fla., with the steel furnished by Bethlehem Steel Corp., total $288,376.70.

3. Fixed-beam bridges, work done by force account, with the county paying for labor and material and employing the Latham Co. of West Palm Beach to furnish equipment and superintend the work, for $77,820 and $50,000 respectively.

Work Closed Down

A stop order dated May 24, 1943, was received from the War Production Board, then a 15-day stay was granted on May 31, 1943, to permit the closing down of construction, and finally on June 15, 1943, permission was given to complete the bases and columns on West Bridge and Bear Cut Bridge and four bents east of the bascule to protect work already done and to eliminate menaces to navigation. On July 10, 1943, permission was granted for the construction of three concrete bulkheads at the east and west ends of Bay Bridge and at the east end of West Bridge at a cost of $200,000 to protect the ends of the dredged fills from erosion during high autumn and spring tides. On September 24, 1943, preferential ratings were given to purchase the necessary materials to complete the above work in order to close down further active construction until after the war, when Dade County will actively push this project to completion as one of its first post-war construction activities.

Purpose of the Project

The purpose of the project is to provide access to Virginia and Biscayne Keys. On the former, the City of Miami is planning the development of a very large airport as a post-war project, and the new causeway will furnish quick, easy access. The county has been developing Biscayne Key as a park, using prison labor for the grading for some time. The park will occupy the north half of the key, which is 4 miles long and varying in width from ¾ to 1 mile. The balance of the key will be developed into high-class shore residential property, little of which is available in this area.

The causeway will be a toll project so that it will be self-liquidating to pay off the total cost, which is estimated at about $4,000,000.

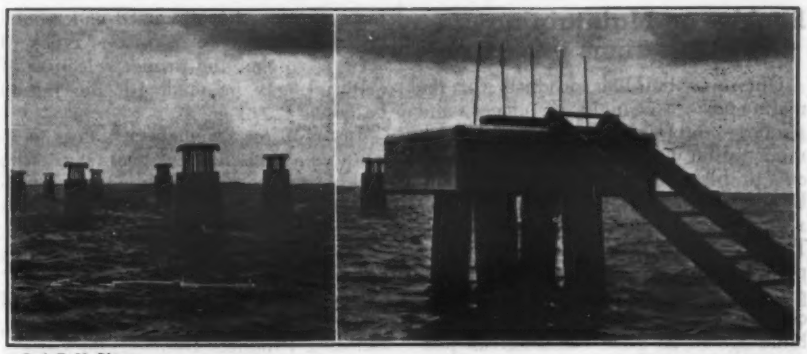
Bridge Design

The bridges are all of similar design except for the bascule span. They are supported by two concrete columns per bent with a concrete beam for a cap. At the abutments there are four concrete-filled Monotube steel shell piles battered at the corners of the footing and one central vertical pile. The footings act as caps on the pile clusters and are carried 1 foot 6 inches below mean low water and 2 feet 6 inches above and are 8 feet square. The tide in this area is only 2 feet.

Each column is 2 feet 9 inches square at the top with a straight section for 9 feet 11¼ inches, and then a batter of ½ inch per foot for the balance of the column to the footing. They are spaced 29½ feet apart, with the overall width of the structure 50½ feet.

The roadway over the bridge is to be 44 feet wide with a 15-inch white-concrete dividing strip and an 18-inch safety walk on either side, intended for fishermen who always frequent bridges in

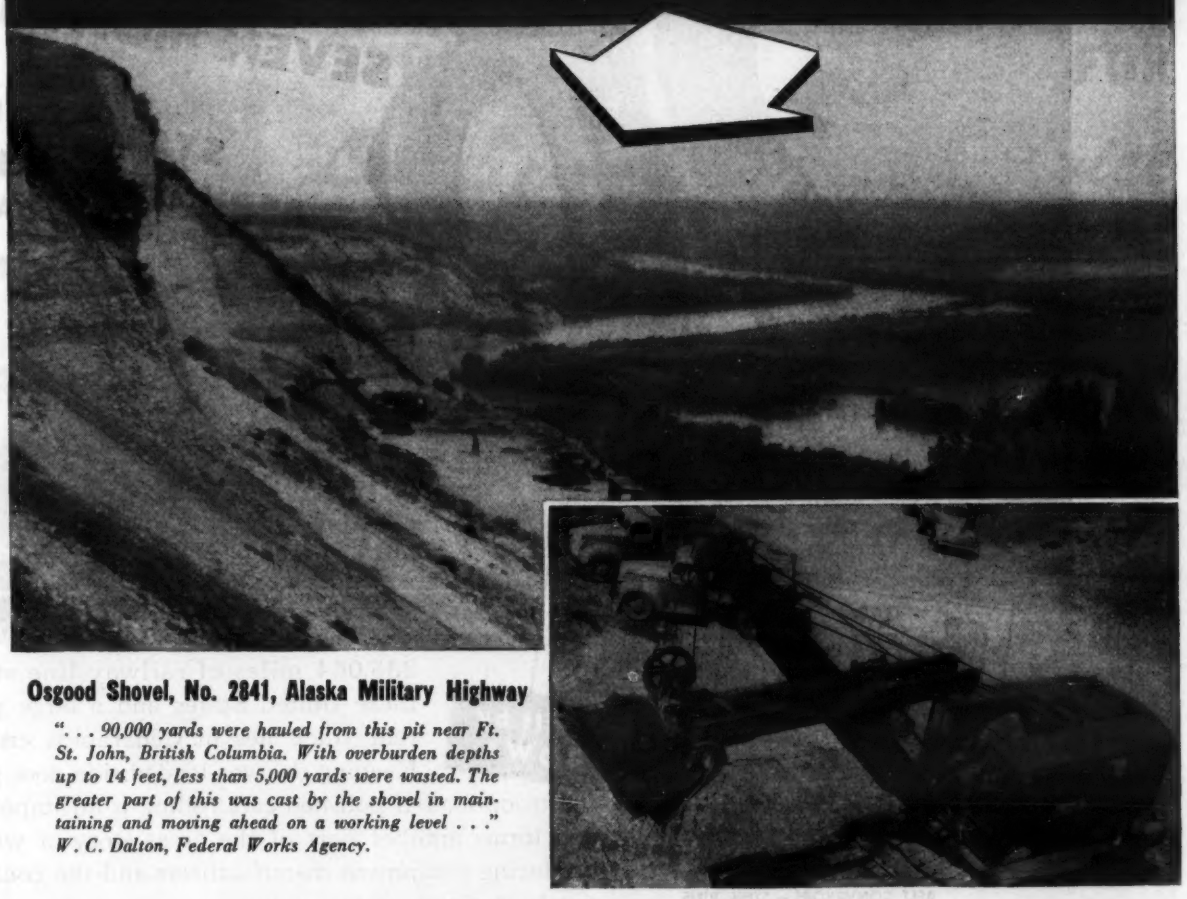
(*Continued on page 68*)



C. & E. M. Photos

Partially constructed portions of the Rickenbacker Causeway across Biscayne Bay, Miami, Fla., construction of which has been postponed until after the war. Left, columns of West Bridge, showing the exposed reinforcing steel which has been protected with an asphaltic paint. At right, West Bridge abutment, showing the Monotube piles and the reinforced-concrete cap.

ON THE ROAD TO VICTORY!



Osgood Shovel, No. 2841, Alaska Military Highway

". . . 90,000 yards were hauled from this pit near Ft. St. John, British Columbia. With overburden depths up to 14 feet, less than 5,000 yards were wasted. The greater part of this was cast by the shovel in maintaining and moving ahead on a working level . . ." W. C. Dalton, Federal Works Agency.

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Booklet on Maintaining Your Buildings in Wartime

Obtaining building products for the maintenance of highway offices and garages, and airport hangars and administration buildings presents a difficult problem today. With this in mind, L. Sonneborn Sons, Inc., recently issued a booklet "Maintaining Your Buildings Today" which covers the subjects of paints, enamels and varnishes, waterproofings, caulking compounds and roof coatings, and floor treatments to keep buildings in as good condition as possible for the duration. Each of the subjects mentioned is discussed and recommendations made for various types of service, so that the proper selection of material may be made for the job to be done.

In addition, Sonneborn offers consultation with its technical staff who will be glad to aid in solving any building maintenance problems and in recommending the proper types of paints, waterproofing or coatings for a specific service.

Copies of this booklet may be secured direct from L. Sonneborn Sons, Inc., Building Products Division, 88 Lexington Ave., New York 16, N. Y.

Forty Years of Service By Continental Rubber

To celebrate the fortieth anniversary of the founding of the Continental Rubber Works, of Erie, Pa., by Theron R. Palmer, President of the company, an attractive booklet "Forty Years of Service" has just been issued. Biographical material on Mr. Palmer, the story of the company's beginnings and growth, the men who have contributed to the development of the firm and its industrial rubber products, and the part it has played in two world wars are featured.

A limited number of copies of "Forty Years of Service" is available. Those interested in securing one may do so by writing direct to the company.

Watch That Grease Gun

Grease is used in anti-friction bearings primarily to protect rolling elements and races against corrosion, not friction. Too much grease develops friction of its own, and the result is overheated bearings. The Allis-Chalmers Operation and Maintenance Review points out the moral to this: don't be too quick on the trigger with that grease gun.

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Built by IOWA

235,064 miles of railway line stretch across these United States and a large percentage of that track lies in Cedarapids crushed ballast. Keeping the war-loaded side-door pullmans and the troop-loaded polished cars rolling is an important war job and forms another part of the great story of what aggregate producing equipment manufacturers and the contractors using crushing equipment are doing.

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New York City Plans Post-War Projects

Program of $700,000,000 Will Be Ready for Bids By July, 1944; Summary Of Labor and Materials

THAT post-war public works planning can be realistic is demonstrated by the program now under preparation by the City of New York, which was described in some detail in an article by Robert Moses, Commissioner of Parks of the City of New York and a Member of the City Planning Commission, in the December issue of *The American City* Magazine.

Mr. Moses reports that money has been provided in New York City's capital budget for design; and executives, engineers, architects, and draftsmen are actually making contract drawings and specifications. At present most of the city's technical staffs and a number of private consultants are engaged in post-war design. Adequate safeguards have been provided to insure a coordinated program of useful and necessary works, and by the middle of 1944, projects having a total estimated construction cost of over $700,000,000 will be completely designed and ready for bids.

Speaking primarily as head of the Department of Parks, Mr. Moses reported that the Park Department projects, ranging in size from large park and parkway construction jobs costing several million dollars to small park buildings and reconstruction of park paths costing only a few thousands will aggregate $115,093,545. All of these projects are necessary parts of a carefully planned program of park and parkway expansion and rehabilitation, coordinated with other arterial improvements in the metropolitan area, and with housing, school, and other construction involving recreation in the broadest sense of the word.

Bigger and Better Parkways

Continuing its pre-war program of parkway construction, New York City is planning to reconstruct and extend the Bronx River Parkway from the Westchester County line to Eastern Boulevard, and the portion of this parkway in Westchester County will also be reconstructed. State funds are available for this work and the plans are complete. Mosholu Parkway from Van Cortlandt Park to Bronx River Parkway, and Bronx and Pelham Parkway from the Bronx River Parkway to Eastern Boulevard, are being replanned as the main east and west scenic drive across the Bronx, with grade eliminations, service roads, new concrete pavement, playgrounds, and landscaped areas along the borders to serve the great apartment population on both sides.

The three great outlying buffer parks of northern New York City, Van Cortlandt, Bronx, and Pelham Bay, with their parkway connecting links will be brought up to date, and Mr. Moses said that it is astonishing to see how little additional land and right-of-way is needed for the purpose.

With the assistance of the Port of New York Authority and the Borough President of Richmond (Staten Island), preliminary plans have been prepared for a complete parkway system in that borough, where there is still an opportunity to do a first-rate job without the compromises and restrictions existing in the other more built-up boroughs. A main artery, Richmond Parkway, will run the length of the island from the proposed vehicular tunnel to Brooklyn at the north to the Outerbridge crossing in the south. Most of the right-of-way has already been acquired for Willowbrook Parkway, which will connect Bayonne Bridge at the northwest with the new Great Kills Park on the Lower Bay.

A third lane of pavement will be placed on all sections of the Belt Parkway in Brooklyn and Queens, where only two lanes now exist, making this a three-lane parkway throughout. All the more recent sections of this parkway were laid out for this additional lane; but on one stretch, known as Laurelton Parkway, which was built some years ago when, Mr. Moses says, six-lane parkways looked extravagant to the budget experts, considerable changes including major railroad adjustments will have to be made as part of the old Southern-Rosedale elimination already planned

(*Concluded on page 76*)

PRACTICAL DESIGN for
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FIRST SERIES
If you are thinking of taking advantage of the new welding techniques together with their lower costs in the Post-War period, you will want these Design Sheets for constant reference. They cover problems from practically every industry from the construction and maintenance fields. You will find many suggestions which can be readily converted to meet your problems. Ask us for them today.
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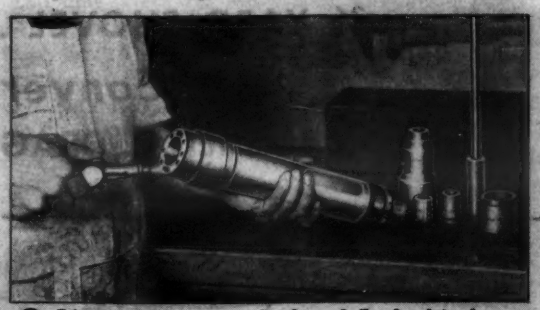
1 Proper way to remove head in order to clean parts — clamp firmly in vise by the flats.

2 Clean parts in kerosene or light oil. They should be well lubricated during reassembly.



3 After parts are washed and flushed in kerosene, they should be blown dry with air jet.

4 Apply packing rings one at a time, staggered. As one ring wears out another can be added.

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Dredging Improves Utility Of Intracoastal Waterway

Program of Widening and Deepening for War Traffic Speeded by Dredges Leased By U. S. Engineers

Part I

✦ THE Intracoastal Waterway, the major waterway lifeline for petroleum shipments from Texas, is undergoing a speedy improvement from Carrabelle, Fla., to Corpus Christi, Texas. Of this work 272 miles west of the Mississippi River and 30 miles east are in charge of the New Orleans District, U. S. Engineer Department. The widening from the old 100-foot bottom width and 9-foot depth to 125 feet and 12 feet respectively is being done by leased dredges as well as under unit-price contracts. A link 25 miles long between the Calcasieu River and the Sabine River, the latter being the border line between Louisiana and Texas, is not included in the improvement program, as it was built originally as a ship canal 125 feet wide and 30 feet deep by local interests.

Greatly increased traffic on the Waterway, with larger and wider tows, made necessary the authorization of the work in December, 1942. As only a comparatively few dredges of adequate power were available and it was essential that work be started immediately, dredges were leased by the New Orleans District, U. S. Engineer Department, and most of them were at work within 48 hours of the receipt of the authorization. The maximum number working at one time within the District was sixteen, although a total of twenty-four dredges worked on the project at some time in the twelve months following December, 1942.

Had this work been placed under contract at the start, there would have been a delay of at least three months for the necessary cross-sectioning of the entire waterway and the laying out of reaches for contracts. During the latter part of 1943, unit-price contracts were prepared for work on large sections, one involving the removal of 4,000,000 cubic yards and another the removal of 10,000,000 cubic yards.

The character of the work, the enlargement of a canal section with slopes varying from 1 on 3 to 1 on 1, is not conducive to record outputs. The material handled included hard clay, hard sand deposits, and soft loose sand, sometimes within the same cross section. At the western end of the work the ground elevation rises to 10 and 12 feet above water elevation, greatly increasing the yardage removed per station. There was also a considerable number of slides from the vertical bank in this section which further increased the yardage.

At Isle Maronne, a cut-off 7,000 feet long reduces the length of the canal by 2,000 feet and eliminates three curves. These curves in the original alignment were in the old Isle Maronne Canal, built by local interests, which was taken over and followed in the interest of economy in dredging, as well as to facilitate securing right-of-way, when this section of the Intracoastal Waterway was first opened in 1932. While the Federal Government does all work such as surveying, construction and maintenance of the Waterway, right-of-way must be furnished by local interests who will benefit by the work. This includes the towing interests and the parishes through which the canal runs. The "parish" is the Louisiana equivalent of the county in other states.

East of this, other improvements in alignment are planned, some involving new canal sections several miles in length. In the original dredging, turnouts were provided at intervals to permit handling special tows up to 75 feet in width under special traffic control. These turnouts are being rendered unnecessary by the enlargement program.

For leased dredges, the rate of pay is determined by the capacity of the dredge and is on an hourly basis. One hundred per cent of the hourly rate is paid for all time during which the dredge is pumping material from the canal section. During the passage of tows or the shifting

(Concluded on page 77)

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Made in 3, 5, 8, 12 and 20-ton capacities; all lift over 6". Only 9" high (20-ton is 10" high).

Every Simplex Hydraulic Jack is tested on a hydraulic press to more than one and one-half times its rated capacity. Adaptability to take rough service is imparted by rugged construction—no delicate wearing parts. Operate in both vertical and horizontal positions.

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CLAMSHELL . . DRAGLINE . . TRENCH HOE

AIR CONTROLLED
MICHIGAN
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BENTON HARBOR, MICHIGAN

Needed Rehabilitation On Principal Highways

(*Continued from page 41*)

pansive volume of new construction involving the usual moderate-to-heavy grading, new drainage structures, new subgrade treatment, new bases, and new pavement. Idaho leads in this classification with a requirement of 4,740 miles to be relocated, followed by Texas with 4,000 and Oregon 2,306 miles. There are ten states reporting between 1,000 and 2,000 miles of this type of work to be done, Arkansas, Kansas, Kentucky, Michigan, Minnesota, Mississippi, North Carolina, Tennessee, Virginia, and West Virginia.

Dollar Volume of Road Work

The actual number of miles which should be rebuilt or widened or relocated is not the true indication of the extent of work expected to be done by the highway departments. The dollar volume is a better measure, as one mile of road graded in a prairie state does not represent the same use of man-power or equipment as a mile of grading in hill country or mountainous terrain would require. For this reason, we are indicating in this section the expected expenditures of those states which are among the leaders in their prospective dollar-volume of highway work.

Texas is the leader again with $730,000,000 as its anticipated expenditure. It is followed by New York with $515,000,000, Ohio $499,700,000, Pennsylvania $409,004,000, Michigan $334,173,000 and Connecticut $221,200,000. In the group reporting between $100,000,000 and $200,000,000 volume of highway work there are sixteen states, including Arkansas, California, Illinois, Indiana, Iowa, Kansas, Louisiana, Massachusetts, Minnesota, New Jersey, Oklahoma, Oregon, Tennessee, Virginia, West Virginia, and Wisconsin.

Bridge Reconstruction

The estimated requirements for bridge reconstruction, either widening or rebuilding, is nearly $1,000,000,000. Louisiana leads with 6,000 small bridges at a cost of $14,000,000; then Ohio with 1,704 at the greater cost of $80,300,000. The figures then drop rapidly to Arkansas, with 2,094 bridges to be improved at a cost of $32,000,000. The group of states reporting between 1,000 and 2,000 bridges for rehabilitation includes Iowa, Kansas, New Mexico, New York, and West Virginia. Texas, which reports but 600 bridges to be modernized for post-war service, expects to spend the top reported sum of $100,000,000.

Ohio reports 42,600 culverts and 425 railroad grade-crossing separations at an estimated cost of $100,000,000, on top of the cost of widening and strengthening bridges. Louisiana, which reported 24 bridges for reconstruction at an estimated cost of $12,000,000, excluded the cost of the projected new Mississippi River Bridge at New Orleans.

Financing the Program

The estimated total of $7,027,428,746 required to bring to par the condition of the existing main highways of our states and their bridges, if expended in three years, represents a fair average between the total of $3,000,000,000 per year, which the American Road Builders' Association studies show to be required to maintain the national income at its war-time prosperity, and the estimated ability of the highway construction industry to expand from its present low to a construction volume at the rate of one billion dollars the first post-war year, two the second, and three the third year, expressed by Frank W. Herring, Assistant Director, National Resources Planning Board, speaking before the American Road Builders' Association at its Post-War Conference in Chicago, in May, 1943.

The ability to pay is another matter. There is much expectation that Federal funds will finance most post-war construction, whether undertaken by the state or by Federal departments. That some funds should come from the Federal treasury cannot be denied, as in 1941, our last pre-war year, the Federal government collected over $500,000,000 as highway-user taxes and this, like all state registration fees and gas-tax collections, should be returned to highway service.

If all the money collected from highway users and for highway purposes through existing real-property taxes were devoted exclusively to the construction and maintenance of our highways, we would have available over $2,000,000,000 each year for these purposes without recourse to borrowing.

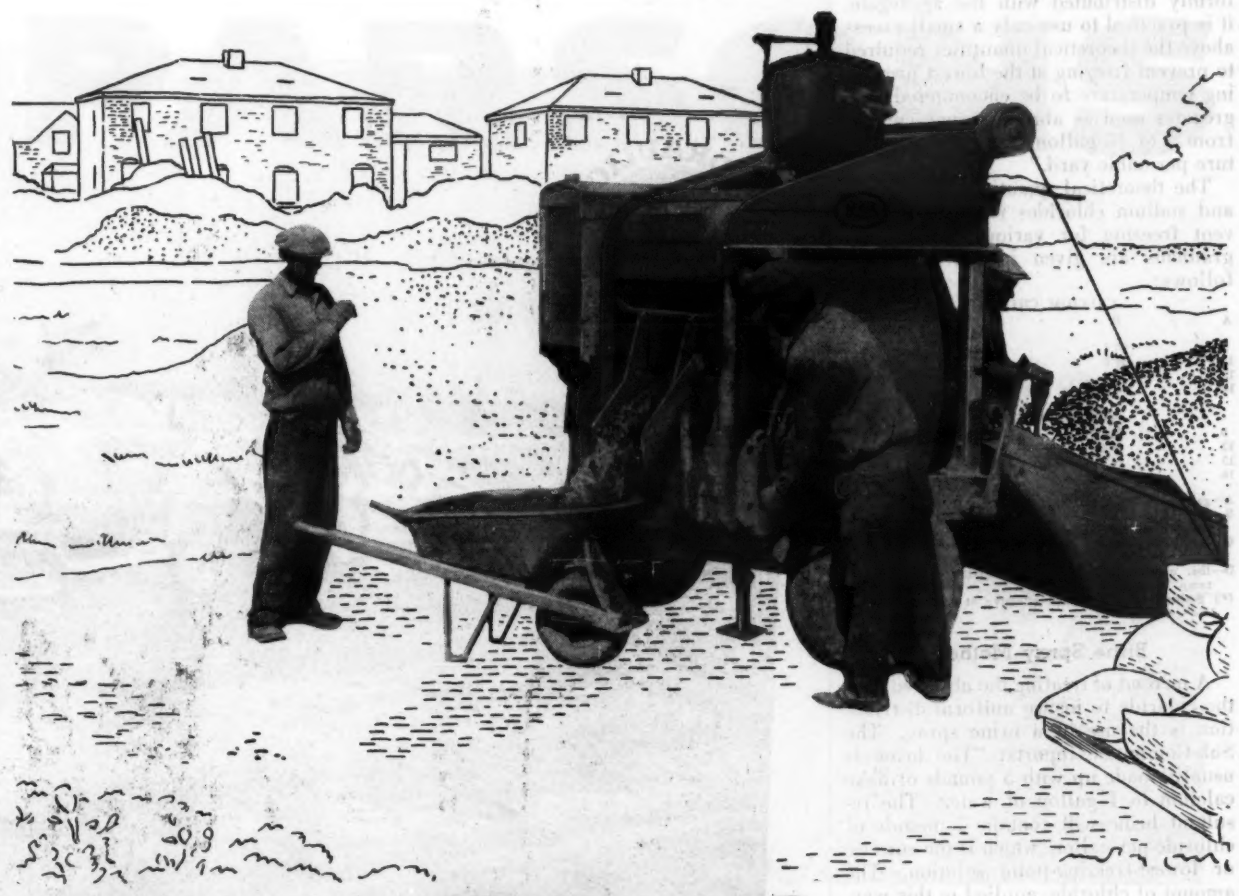
The American Road Builders' Association, in the fourth edition of its post-war plan for highway construction entitled "A Sound Plan for Post-War Roads and Jobs", states, "Highway construction immediately following the war cannot be entirely financed from highway-user taxes because of reduced income by reason of war restrictions. Highway-user tax shrinkage will accelerate as motor vehicles, suffering from old age, disappear from the highways. Meanwhile, expenditures for highway construction are rapidly decreasing. As a result, some reserve funds are accumulating in areas where highway-user funds have been used exclusively for highways.

"In other areas, this reserve does not exist, due partly to the use of funds for purposes not directly connected with highway construction, bond obligations, and for emergencies. Immediate financing must be done by the use of post-war reserve funds, current income from motor-vehicle taxes, Federal funds and bonding.

"The last-named method may solve part of the financing problem during the period immediately following the war. This method has been used successfully for many years, with bond income to state highway departments ranging from $28,000,000 to $233,000,000 annually. When the war ends, with plans for projects amounting to many millions of dollars ready, if an employment emergency arises, bond financing would be a quick solution to the financing problem."

Wickwire Spencer Names Dunlap to New Position

Announcement has been made by the Wickwire Spencer Steel Co., New York City, of the appointment of Robert T. Dunlap as General Superintendent of the company's Buffalo Works. Mr. Dunlap, who was recently named Assistant to the President of Wickwire Spencer, is replacing William A. Steele, former Buffalo General Superintendent, who has resigned. Prior to joining this company, Mr. Dunlap was General Works Manager of the Vulcan Iron Works, Wilkes-Barre, Pa., and had previously had wide experience in steel production and plant operation.



Tomorrow Means Today...

WITH REX MIXERS

"TIME SAVERS!" That's what users call the Rex mixers. And time-savers are just exactly what these husky mixers are. With their much faster charging and their 6 to 7 second discharge, they get the jobs done faster . . . more economically. With Rex Mixers, you can change *tomorrow* into *today* on the schedule.

There are a lot of other exclusive features, too! Water control is practically 100% accurate . . . drum heads are pressed steel, die formed and welded integrally with the center sheet, eliminating pounds of excess baggage . . . the accurately formed track and rollers support the load without distortion and maintain perfect alignment through years of tough service, develop no flat spots. And the one and only chain belt drive cushions shocks—prolongs mixer life. Those aren't all! Rex mixers have other exclusive features . . . all designed to give you faster, more economical service.

Investigate Rex Mixers—See how they can help you do the job faster at lower costs. And check the other equipment in the Rex line: Moto-Mixers, to speed the mixing, hauling and placing of concrete . . . Pavers, that can give you really heavy yardage production, faster . . . Pumpcretes, that pump concrete by pipe line . . . Pumps, that move water economically and efficiently. Get the complete story. See your Rex Distributor or write Chain Belt Company, 1666 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT COMPANY
of Milwaukee

REX CONSTRUCTION MACHINERY

Ice on Highways

(*Continued from page* 19)

drop and the moisture content of the stored material. It is important that the chloride be well distributed in the stockpile as an excess of chloride with too much moisture contributes to ice formation within the stockpile. Additional chloride may be added while trucks are being loaded from storage piles of abrasives. While untreated abrasives can be used on light traffic roads, the chloride is necessary to prevent their being whipped off by fast heavy traffic or high winds.

Storage of abrasives in watertight bins makes it possible to add the entire amount of chloride at the time of storage. The Highway Research Board Sub-Committee, in reporting on storage, states: "When abrasives are stored in covered protected bins, it is possible to use considerably less chloride as the loss from dilution and leaching is removed. In such cases, if the chloride is uniformly distributed with the aggregate, it is practical to use only a small excess above the theoretical quantities required to prevent freezing at the lowest prevailing temperature to be encountered. Aggregates used as abrasives may contain from 9 to 18 gallons of water as moisture per cubic yard."

The theoretical quantities of calcium and sodium chlorides required to prevent freezing for various temperature gradients are given in the report as follows:

A	B	C	D
	CALCIUM CHLORIDE		
9	20.3	28.7	35.4
12	26.8	37.7	46.5
15	33.4	47.2	58.2
18	40.2	56.4	70.0
	SODIUM CHLORIDE		
9	14.7	22.4	(*)
12	19.6	29.9	
15	24.4	37.4	
18	29.4	44.8	

A—gals. of water in aggregate per cu. yd. as received
B—lbs. of chloride per cu. yd. aggregate required for temp. down to +10 degrees
C—lbs. of chloride per cu. yd. aggregate required for temp. down to —5 degrees
D—lbs. of chloride per cu. yd. aggregate required for temp. down to —20 degrees
(*) Sodium chloride is not effective at temperatures below —6 degrees

Brine Spray Method

A method of treating the abrasive with the chloride to insure uniform distribution is the use of a brine spray. The Sub-Committee reports: "The brine is usually made up with 5 pounds of flake calcium to 1 gallon of water. The resultant brine will contain 4 pounds of chloride per gallon, which is the eutectic or lowest-freezing-point solution. The amount of chloride, applied in this way, which can be held by the abrasive without loss from drainage is controlled by the moisture content of the abrasive as received. However, it is generally possible to use about 8 gallons of brine per cubic yard of abrasive with a negligible loss of chloride. The operator, after a few initial tests and trials, learns to soak the abrasive without over-saturation. The brine is usually sprayed on the abrasive as it is being loaded into bins or into covered stockpiles. Eight gallons of brine introduces about 32 pounds of chloride to 1 cubic yard of abrasive. This amount is sufficient for pre-treatment to prevent freezing in the bins and for use on the road at temperatures down to about 20 degrees F. For lower temperatures, it becomes necessary to add additional flake chloride as given in the table below for use with common sand.

A	B	C	D	E
6	24	16	26	36
8	32	8	18	28
10	40	0	10	20
12	48	0	2	12

A—gals. of brine used per cu. yd. of abrasive
B—lbs. of chloride per cu. yd. of abrasive introduced
C—lbs. of additional flake chloride per cu. yd. required for +10 degrees
D—lbs. of additional flake chloride per cu. yd. required for —5 degrees
E—lbs. of additional flake chloride per cu. yd. required for —20 degrees

"The brine treatment provides a saturated unfrozen condition of the abrasive which considerably hastens the solution of any additional flake chloride required. The method is especially adapted to use with cinders or other high-absorption abrasives which may be received comparatively dry."

Storing Abrasives

Certain precautions must be taken to protect abrasives from freezing. Use of chloride will provide this protection for a certain length of time but exposed stockpiles subjected to rain and melting snow will lose the chloride by leaching, thus permitting the stockpile to freeze with resultant difficulties in loading and impossibility of effective spreading. The Sub-Committee reports on storage as follows:

"*Bins*—The erection of bins at strategic locations so that they will serve more than one road, if possible, is the most desirable method of storing abrasives. A bin to be used efficiently should be accessible at two elevations, one at

(*Continued on next page*)

LOOKING AHEAD?
Include
TUTHILL GUARD RAILS
in Your Plans

HIGHWAY ENGINEERS are now making plans for their post-war safety program. Many of them, knowing by reputation and service the TUTHILL GUARD RAIL, are including it in their post-war specifications.

Unique in its convex design and spring-like deflective action, substantial, strong and attractive, easy to install and maintain, TUTHILL is the logical Guard Rail to *specify now* for *use later.*

Pacific Coast Manufacturers and Distributors
U. S. SPRING & BUMPER CO., LOS ANGELES, CAL.

Write for detailed specifications.

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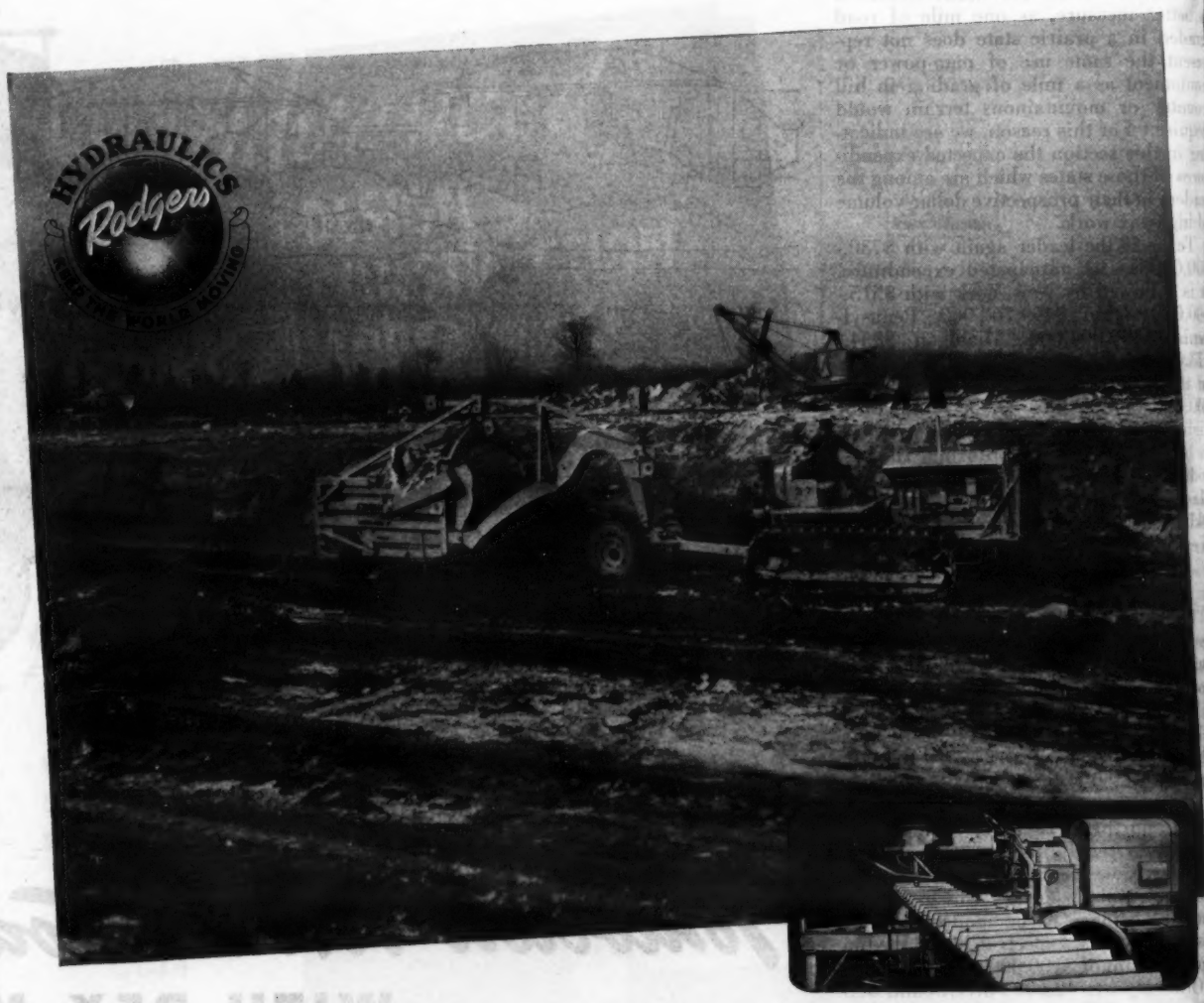


You've Got to "Crawl" Before You Can Fight

Wars are won by well planned strategy carried out by an army trained and well equipped with the most modern tools Industry can produce.

Maybe it's a new airfield in the interior of Italy, or a new road in the wilderness of New Guinea—wherever crawler type tractors tussle with vital construction jobs or heavy road building, Rodgers Hydraulic Track Presses furnish speedy repairs for all makes of track equipment.

Illustrated above is the Rodgers Hydraulic trailer track press with track wrench and Retractable Jaw, the greatest improvement ever made in track press equipment. *If it's a Rodgers, it's the best in Hydraulics.* Rodgers Hydraulic Inc., St. Louis Park, Minneapolis, Minnesota.

Manufacturers of: Universal Hydraulic Presses - Track Press Equipment - Hydraulic Keel Benders - Hydrostatic Test Units
Power Track Wrenches - Hydraulic Plastic Presses - Portable Straightener for Pipe and Kellys

Rodgers HYDRAULIC Inc.

Highway Sanding

(*Continued from preceding page*)

an upper level so that trucks can discharge into the bin and the other on a lower level so that trucks can be loaded directly by means of a gate. The floor of the bin should slope toward the gate. The capacity should be 50 to 100 yards or larger, depending on the type of road to be serviced.

"*Sheds*—Next to the bin in efficiency is the shed. It should also be built in a strategic location, usually where the differences in elevation necessary for a bin are not obtainable. A shed should have a capacity of at least 100 yards and the side walls should be strengthened so that the sand may be piled against them. It is desirable to have three sides and the roof covered. The open side should face west in order to take advantage of the afternoon sun. A belt or bucket-type loader should be available for loading.

"*Stockpiles*—Where it is not possible to have either a bin or a shed, the abrasives should be placed in a stockpile. Such a pile should have a triangular cross section about 6 feet high and 14 feet wide at the base. It is desirable to cover these piles with waterproof paper. Paper for this purpose should be reinforced and have a Mullen bursting-strength test of at least 100 and a water absorption of not more than 12 per cent after 30 minutes of immersion. Experiments indicate that the effectiveness of calcium chloride as an agent for prevention of freezing in stockpiles not covered extends over a very limited period. Sodium chloride, on the other hand, has a tendency to go into solution when it gets wet and to recrystallize when it dries out."

Speedy Loading

When an ice storm occurs or a wet snow is plowed off and a drop in temperature causes ice to form, it is necessary to apply the abrasive at once as traffic continues despite weather conditions which make driving hazardous. This means that the abrasive, treated or protected to prevent freezing into lumps, must be loaded quickly into suitable trucks and applied promptly. By stockpiling or storing abrasive at frequent points, and near locations where hazardous ice conditions develop year after year, the dead-heading of trucking for loads with consequent loss of time is reduced to a minimum.

Loading by hand is slow and generally wasteful of material and manpower. Where elevated bins are available and trucks can drive under the gates they can be loaded very rapidly. Where storage is in sheds or stockpiles, all large trucks, and small trucks if possible, should be loaded by mechanical self-feeding loaders.

Spreading the Abrasive

Before the abrasive is spread on the road, as much snow as possible should be bladed off and layers of ice reduced by blading or scored with saw-tooth or serrated blades to roughen it to hold the abrasive more easily and concentrate the melting effect of the chloride. Any loosened ice should be plowed from the surface of the road before the abrasive is spread.

The abrasive is usually applied from dump trucks through some type of mechanical spreader at rates from ½ to 1 pound of sand or cinders per square yard. This gives an effective non-skid surface if applied uniformly. The use of chloride-treated abrasive should be kept to a minimum on concrete pavement because of the damage by scaling of the surface.

Trucks of 3 to 5-ton capacity with built-up sides and a mechanical spreader are the most effective units for ice control. As pointed out in the report referred to above, any type of truck with a dump body can be used, including the big all-wheel-drive plowing units. Mechanical spreaders, which should be installed on each piece of snow-removal equipment which has a dump body, are generally of two types: either attached to the truck and carried by it, or mounted on a 1 or 2-wheel trailer attached to the truck. Power to operate the agitator within the hopper of the spreader and to run the spinner which gives a uniform distribution across the pavement is secured by belt drive from the rear wheels of the truck, from a gas engine on the spreader, or from a wheel attached to the spreader and running on the road surface.

Massachusetts has developed a special spreader with a 6-yard trough-shaped hopper in place of the conventional truck body. The sand is fed to the spreading mechanism by a screw con-

(*Concluded on page 79*)

EXPERIENCE *builds 'em* PERFORMANCE *sells 'em*

AMERICA'S shipbuilding industry will launch more ships in 1943 than all the rest of the world combined.
ROGERS TRAILERS are a vital link in the mass-production method of ship construction for they are transporting heavy machinery . . . boilers, bulkheads, engines . . speeding Victory ships down to the sea!

on ROGERS TRAILERS

ROGERS TRAILERS are serving efficiently on the home-front too and new models which will be available when war contracts are completed, will be even more efficient than the multitude which have been so successfully operated by industry for many years.

ROGERS BROS. CORPORATION
ALBION,
PENNA.

PARSONS

OFFSET BOOM TRENCHING SAVES TIME

Avoid costly hand excavation on difficult trenching by using a Parsons Trencher.

The offset boom, standard on Parsons Trenchers, makes it easy to dig close to steep banks, near trees or poles and next to curbing. The trench may be cut on line with the outside edge of either crawler just as efficiently as with the boom in center position.

It takes but a few minutes to shift the boom to any position across the width of chute. The shift is positive through its rack and pinion mechanism and the boom is held solidly with heavy bolts through boom and carriage frame.

This is only one of the superior Parsons features.

THE PARSONS CO • NEWTON, IOWA

TRENCHING EQUIPMENT PARSONS

Acme Photo by Charles Corte, War Pool Photographer
A mule trail in an Italian forest becomes a roadway for American troops and supplies. The Caterpillar D8 and LeTourneau Angledozer work to change the direction of the supply route in the battle of Naples.

Essential Resurfacing On Indiana Highways

(*Continued from page 8*)

the Federal requirements. The resurfacing consists of about 3 inches of binder and wearing course, depending on the ultimate strength needed to develop the full value of the pavement being resurfaced.

All of the high-type work is done under 2-way traffic with adequate barricades to prevent accidents by vehicles running into the widening trenches or onto the newly placed bituminous material in the trenches. All edge failures are removed and repaired with the bituminous concrete either before or at the time of placing the base courses in the trench. The trenches are excavated either with the blade of a power grader or with a power-operated trencher of the Buckeye type. The trench rollers used for consolidating the subgrade, the insulation layer where placed on weak subgrade, and the base material are the equivalent of a 10-ton roller.

For resurfacing, the material is usually placed in two 1-inch layers for a width of 22 feet 6 inches for the binder after the original surface is thoroughly cleaned with a rotary broom and primed with 0.1 gallon of cut-back asphalt RC-1 or emulsified asphalt per square yard. All repairing of holes, depressions, wedge courses, and superelevation is done with the binder-course mixture prior to the actual resurfacing.

The use of self-propelled spreaders is permitted, provided they leave a continuous smooth surface for the rolling. The binder course must be permitted to cure before the rock-asphalt wearing course is laid and rolled. If the work is started in one season and not completed, so that it must wait until the next before the rock asphalt is laid, the binder must be allowed to cure and then sealed with 0.15 gallon of cut-back asphalt RC-3 or emulsified asphalt per square yard and covered with 10 pounds of an aggregate 20 to 50 per cent of which is retained on a No. 4 sieve and 99 to 100 per cent is retained on a No. 100 sieve.

The rock-asphalt surface course is laid 3 inches narrower on each side than the binder course. Prior to laying the wearing course, the binder course is thoroughly cleaned by a rotary broom if necessary and primed with cut-back asphalt RC-1 or emulsified asphalt at the rate of 0.05 to 0.10 gallon per square yard. The contractor is required to start the application of the rock asphalt as soon as practicable after the first application of the binder course.

The trench remaining after the steel road forms used to confine the bituminous widening material are removed is backfilled in two equal layers up to the level of the new pavement, and each layer is rolled by the pneumatic tires of a truck weighing at least 4 tons. The surplus material from the trenches is distributed over the shoulder on a slope not less than 1 on 12 or hauled not more than 2,000 feet for disposal at least 300 feet outside the right-of-way.

The Contracts

The twenty contracts which were originally approved by PRA and WPB for resurfacing in 1943 in Indiana totaled $2,630,000 for 157 miles of work. This included some work on city streets 40 feet wide, but the standard work which accounts for most of the mileage was on 18-foot highways, which were widened to 22 feet and resurfaced with a binder course and rock-asphalt wearing surface. The work was done by Indiana contractors under the direction of the State Highway Commission, S. C. Hadden, Chairman, and N. F. Schafer, Superintendent of Maintenance.

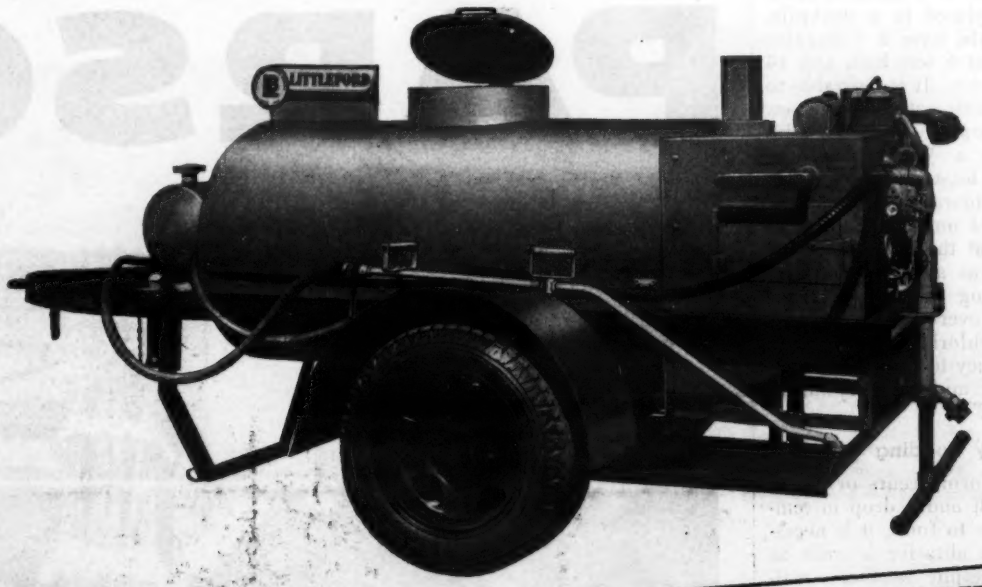
A pint of your blood can save a life. Make your contribution today.

How to Pump It

This is the title of a new descriptive catalog on Rex Speed Prime pumps, giving complete information on the mechanical parts and construction of these pumps, how they operate, and what they will do. Also included are specifications and capacity charts to aid in pump selection.

Rex Speed Prime pumps are made in capacities ranging from 3,000 gallons an hour to 125,000 gph. Although they have found application in many industries, their chief use is for dewatering and their features, including their positive self-priming, were designed for this service.

Copies of this catalog, as well as other catalogs on the complete line of Rex construction machinery, including concrete mixers, truck-mixers, pavers and Pumpcrete, may be secured by those interested direct from the Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.



MODEL No. 101 UTILITY SPRAY TANK

Here's a Unit that will cut post war Black Top Construction and Maintenance costs to a minimum. Designed by Littleford to do three jobs instead of one. Model No. 101 will handle tar, asphalt, cutback, and emulsion. Model No. 101 is heated by Littleford Vaporizing Torch Type Burners.

When planning for the future, include a Littleford Model No. 101 Utility Spray Tank; why purchase three units when the No. 101 will do the work.

1 Model No. 101 can be used as a Distributor, has Spray Bar for small application jobs.

2 For crack filling, Model No. 101 has pouring pot outlet.

3 Spraying patches with the Hand Spray is the popular use for the Model No. 101.

LITTLEFORD

LITTLEFORD BROS., Inc.
485 E. Pearl St., Cincinnati, Ohio

Taking Proper Care Of Clamshell Buckets

The proper use of a clamshell bucket is one way of insuring its long life at a time when it is difficult to buy new buckets. A 20-page booklet "Maintenance and Care of Clamshell Buckets" has been released by the Blaw-Knox Division, Blaw-Knox Co., Pittsburgh, Pa., telling how to take care of clamshell buckets in the great diversity of uses to which they are put.

There are instructions for the operation of lever-arm buckets, lubrication instructions, a discussion of ways and means of lengthening cable life, instructions on how to reeve the bucket for digging efficiency, a discussion of the proper location of counterweights, and a series of instructions for the maintenance of the lever-arm sheave assembly and for removing and replacing ball bearings in the lever-arm sheaves. This is only a part of the illustrated information which can help operators and maintenance men to lengthen the lives of their clamshell buckets.

Copies of this Bulletin 1930 may be secured direct from the manufacturer.

New Division Manager Of Bastian-Blessing

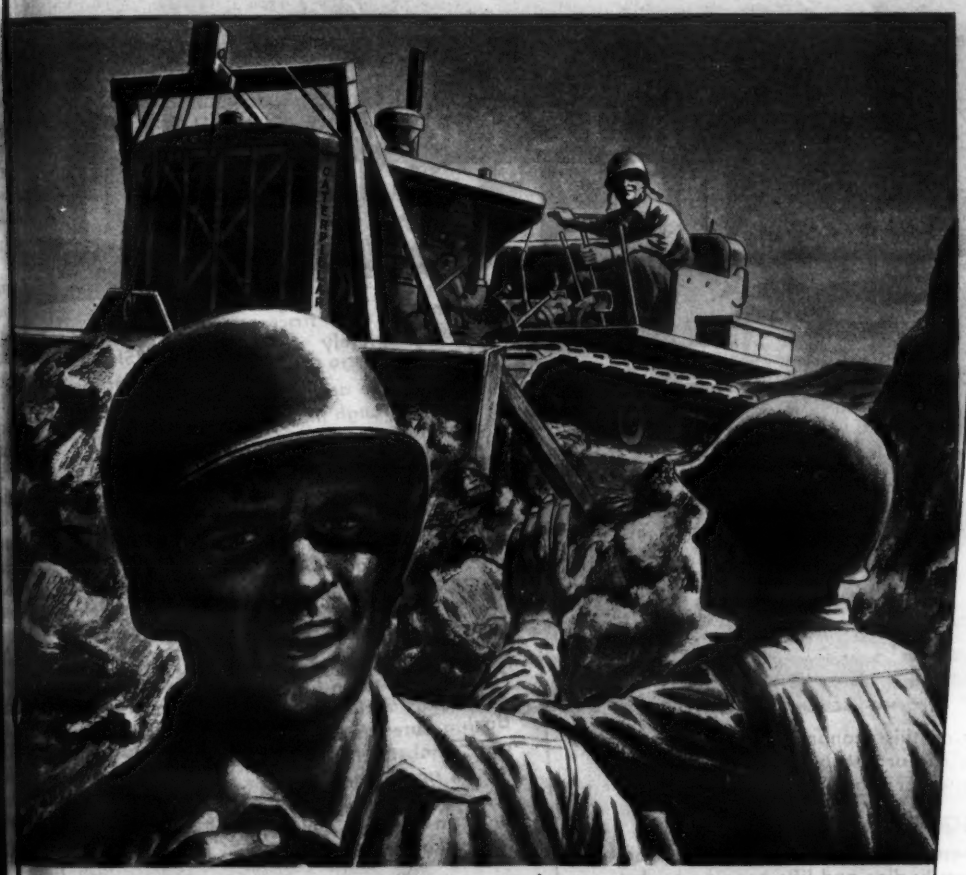
The Bastian-Blessing Co., 4203 Peterson Ave., Chicago 30, Ill., has announced the appointment of Frank H. Fisher of Chicago as Manager of the company's Welding & Cutting Division. Mr. Fisher will supervise promotional and sales work of the Bastian-Blessing Rego line and work in close cooperation with customers.

He brings to his new work a background of practical experience, having previously been associated with American Steel Foundries of Chicago, and also serving for a number of years as District Sales Manager of R. Cooper, Jr., Inc., the Chicago distributor for General Electric.

The Bastian-Blessing Co. is now carrying on research work on new models and refining and improving its present products while devoting its present manufacturing facilities exclusively to the production of war material.

Tools are weapons—treat 'em right. Keep them in service as long as possible; then put them to work as scrap.

"CATERPILLAR" DIESELS ARE WORTH WAITING FOR!



THE FIGHTING FOUR

INSPECT Look your equipment over frequently. For expert "internal" inspection of operating parts or functions, call in a trained "Caterpillar" service man. Read your Operator's Instruction Book.

LUBRICATE Use the right oil at the right time in the right place and in the right quantity. Keep the oil clean—change before it becomes dirty and deteriorated. Follow the Operator's Instruction Book.

ADJUST Tighten all bolts. Keep fan belt and tracks at proper tension. Read the Operator's Instruction Book. For fuel injection valves and other precision adjustments, let your experienced service-dealer do the work. He'll do it well.

REPLACE Have your service-dealer replace or repair worn bearings, track rollers, pins and bushings, sprockets, cylinder liners, clutch linings. His service helps restore power and extend equipment life. Saves critical materials, too.

RIGHT NOW, "Caterpillar" production is at an all-time peak—far bigger than it ever was in peacetime. But when the Armed Forces have taken the lion's share of these machines that they need so much and use so well, there are nowhere near enough left to meet the world-wide demand. The War Production Board is allocating the available balance as fairly as possible among civilians whose work is essential to the war effort. Thousands of other prospective purchasers are asked to wait for their new "Caterpillar" Diesel equipment—but it will be *worth waiting for.*

"Caterpillar" Diesel Tractors, Motor Graders, Engines and Electric Sets have been good in the past. They will be better in the future. No "dream machines," but *proved* on the toughest testing-grounds the world has ever seen—the battle fronts of this war. They'll have the same ruggedness and simplicity, the same economy and dependability you have always known and liked.

When victory comes, you won't have to wait while the factory reconverts. "Caterpillar" production lines will keep right on rolling them out, and machines will be obtainable in larger numbers than ever because of our vastly expanded output.

You'll buy your new "Caterpillar" Diesels from the same trusted dealer who knows your problems and has continued throughout these critical times to serve you well.

With his help in servicing and maintaining your old machines, you can afford to wait for the equipment that is your first choice. It will be available the minute war conditions permit.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS!

Study of Operations Aids Safety Program

(*Continued from page* 35)

actual out-of-pocket cash for a single accident ran around $5,000, from an accident which could and should have been avoided.

There is the record of one workman who, through his own carelessness and lack of training and that of an operator, was caught in an elevating grader between the power take-off and the carrier platform. This man had been on the job only a few days. In these times there are many men without previous experience working on construction jobs, but a little more time spent in showing green hands just the things which an accident record shows helps to prevent accidents of that type.

Some Do's and Don'ts

Here are a few things which my record bears out and which should have "priority" with every machine operator.

Every time there is a temporary halt in operations, check your equipment. The change in type of work, from operation to inspection, furnishes as much relaxation as just sitting down. This extra check gives the operator extra confidence in his machine, and enables him to deliver more and better work.

Never allow a new man to have complete control of an outfit until his experience warrants it. In actual work-hours accomplished, the job will be ahead if this rule is followed and sufficient time is taken to train the man properly. If an operator, especially a new one, is easily excited, assign him to some job where his condition will be the least accident hazard. Do not take chances with a high-strung workman.

Accept no substitute for the best equipment. This rule is hard to follow today, when every job is "rush" and it is not always possible to secure the needed new equipment. But the operator who sticks as closely to this rule as possible, and insists on his co-workers sticking to it, will do more work and have fewer accidents.

If the success of your job depends on the performance of a cable, the selection of the right type of wire rope in the first place, and its regular inspection and lubrication are of paramount importance. If the cable runs over small sheaves and drums, and if high-speed operation is required, I believe there is no substitute for preformed wire rope. The life of rope of this type is usually two or three times that of the same quality of ordinary-lay rope, and I believe that the difference in the accident hazard alone warrants the use of the more costly rope.

If your machine needs a repair job, or a rope needs switching, *do that job*. No deadline is so urgent that a machine which is liable to break down and cause an accident to workmen or other equipment should be forced to operate regardless of repair needs. In ten years of continuous machine operation, and in nearly five years of keeping a daily record, I have never found a single case where neglecting a needed repair job saved time.

Another rule which I try to follow religiously is to read everything I can get my hands on about safety and the proper care of my machines,—trade papers in our field, magazines on safety, manufacturers' folders and bulletins on the operation and maintenance of their equipment. This is nearly as good as keeping a personal record and studying it frequently—but with one important difference.

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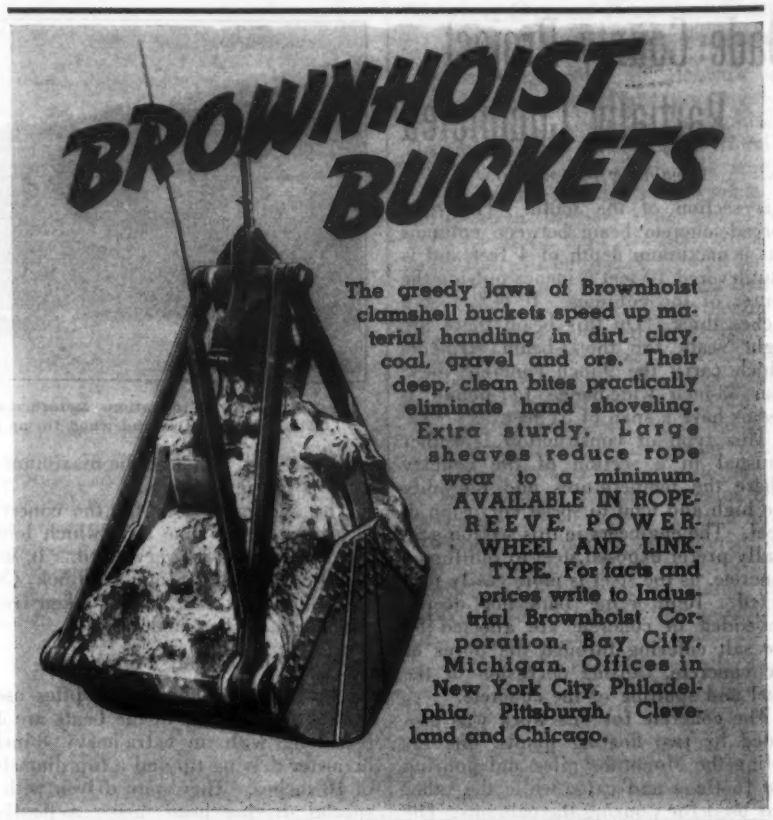
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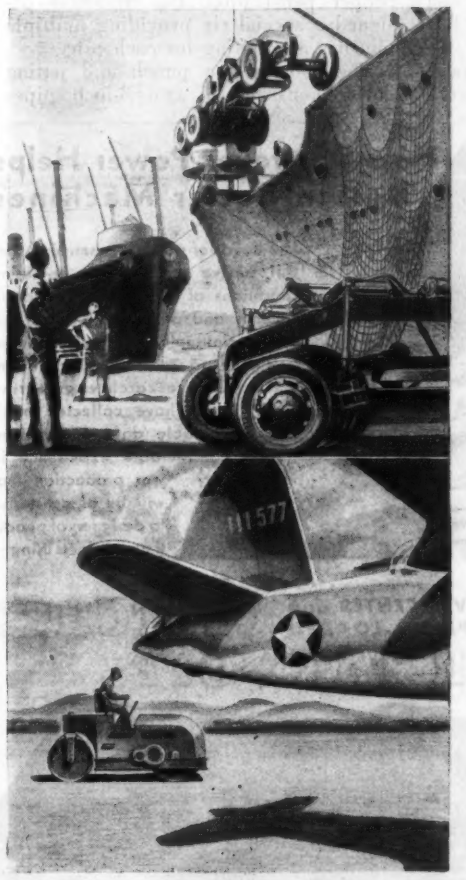
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Our fighting forces must get a heap of satisfaction out of the fact that here on the home front there are tough, hardened working men and women . . . as dependable as themselves. If we are to help them turn on the lights of the world again we must continue to fight back here—continue to go all out on the production lines.
When we read of victories it is easy enough to become complacent and self-satisfied. Actually this is bad for us—winning a race does not always mean winning at the races. Let's keep on serving our armed forces—doing the kind of a job that will lead the Marines back to Wake and Guam—that will bring them all home sooner. In doing this—let's keep our wicks clean for that brighter light in the future.
Galion continues to serve with essential equipment for the Air Force, Coast Guard, Engineers, Marines, the Navy and the Seabees.
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Study of Operations Aids Safety Program

(*Continued from page 35*)

actual out-of-pocket cash for a single accident ran around $5,000, from an accident which could and should have been avoided.

There is the record of one workman who, through his own carelessness and lack of training and that of an operator, was caught in an elevating grader between the power take-off and the carrier platform. This man had been on the job only a few days. In these times there are many men without previous experience working on construction jobs, but a little more time spent in showing green hands just the things which an accident record shows helps to prevent accidents of that type.

Some Do's and Don'ts

Here are a few things which my record bears out and which should have "priority" with every machine operator.

Every time there is a temporary halt in operations, check your equipment. The change in type of work, from operation to inspection, furnishes as much relaxation as just sitting down. This extra check gives the operator extra confidence in his machine, and enables him to deliver more and better work.

Never allow a new man to have complete control of an outfit until his experience warrants it. In actual work-hours accomplished, the job will be ahead if this rule is followed and sufficient time is taken to train the man properly. If an operator, especially a new one, is easily excited, assign him to some job where his condition will be the least accident hazard. Do not take chances with a high-strung workman.

Accept no substitute for the best equipment. This rule is hard to follow today, when every job is "rush" and it is not always possible to secure the needed new equipment. But the operator who sticks as closely to this rule as possible, and insists on his co-workers sticking to it, will do more work and have fewer accidents.

If the success of your job depends on the performance of a cable, the selection of the right type of wire rope in the first place, and its regular inspection and lubrication are of paramount importance. If the cable runs over small sheaves and drums, and if high-speed operation is required, I believe there is no substitute for preformed wire rope. The life of rope of this type is usually two or three times that of the same quality of ordinary-lay rope, and I believe that the difference in the accident hazard alone warrants the use of the more costly rope.

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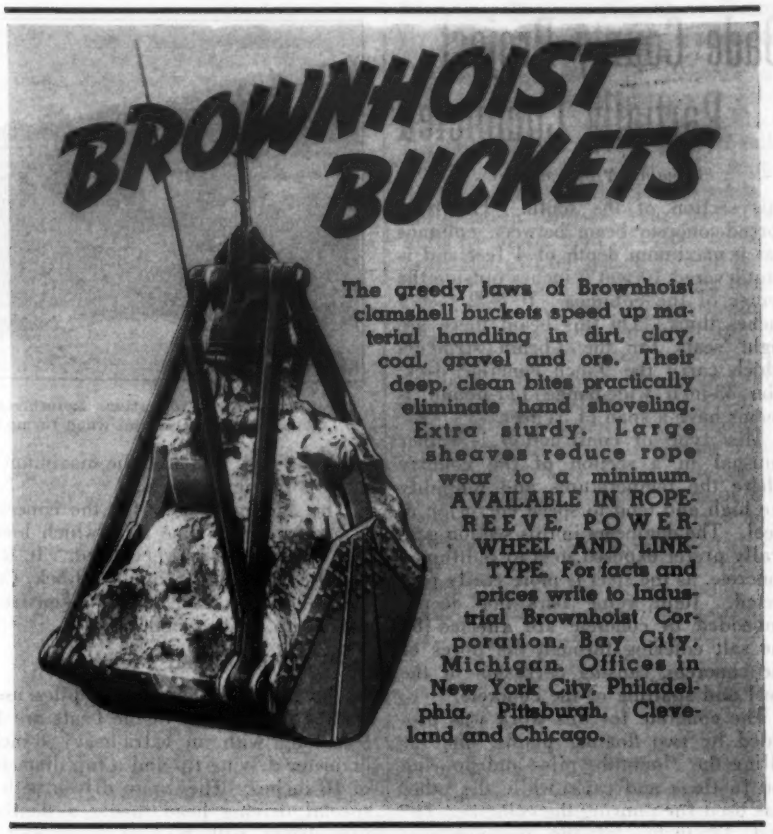
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WE ARE DEPENDABLE
As Dependable As The MARINES
Our fighting forces must get a heap of satisfaction out of the fact that here on the home front there are tough, hardened working men and women . . . as dependable as themselves. If we are to help them turn on the lights of the world again we must continue to fight back here—continue to go all out on the production lines.
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The Galion Iron Works & Mfg. Co.
Main Office and Works: Galion, Ohio

Dade County Project Partially Completed

(*Continued from page 57*)

this section of the south. The reinforced-concrete beam between columns has a maximum depth of 4 feet and is cantilevered 10 feet 6 inches outside the center of the columns. It is 2 feet 9 inches thick. On this beam there are eight seats for the I-beam stringers which carry the 9-inch concrete deck. The 33-inch wide-flange 141-pound I-beams have a span of 51 feet.

This type of construction is rather unusual in a section of the country where the temperatures and humidity are high and tend to speed corrosion of steel. The engineers in this section generally prefer exposed steel to reinforced concrete, as the steel is more easily protected. Reinforcing bars not deeply imbedded in concrete are affected by the salt entering through the pores of the concrete, causing corrosion of the steel and spalling of the concrete.

The concrete for this work was provided by two floating plants, one for filling the Monotube piles and pouring the footings and caps, while the other was used for pouring the columns. The first 12 inches of the footings was poured under water with a tremie and the balance in the dry. The first foot of concrete acted as a seal for the bottom of the form, which was pumped out as soon as the concrete had set and the balance poured in the dry. The fact that the tide has a range of only 2 feet here greatly aided the pouring of the footings, and the depth of the water over a considerable length of the work

C. & E. M. Photo
Packed up for the duration. Reinforcing and structural steel as well as these Monotube piles and wood forms have been stored on Biscayne Key.

is only 5 feet, although the maximum is 20 feet in the channels.

The aggregate used for the concrete is a crystallized lime rock which looks like quartz and is very hard. It was supplied by the Seminole Rock Co., west of Miami, Fla., and is taken from pits 20 to 30 feet under water.

Pile-Driving Methods

The Monotube fluted-steel piles used for the foundations of the bents are 45 feet long with an extra-heavy 8-inch-diameter driving tip and a top diameter of 18 inches. They were driven with a special driving head, using a floating pile driver with 65-foot leads and a Vulcan steam hammer. Each pile was driven to a tested 42-ton bearing. They were all driven into rock so there was no trouble with the bearing, but the penetration was difficult. To insure the proper penetration, the engineers designed a special rig providing multiple punches and jetting for each pile.

The combination punch and jetting device consisted of two 3-inch pipes delivering water at 150-pounds pressure with a sharpened railroad rail between and on the outside of the jets. This was raised and lowered rapidly to cut the rock and wash the broken material away until the required penetration for the pile was secured. This was between 25 and 35 feet below the bottom of the bay. There was considerable cut-off of the piles which were concreted 1½ feet in the footings.

Because of the swift water in Bear Cut channel, the pile-driver leads had to be rerigged to permit accurate driving of the batter piles. They could be used satisfactorily for two batter piles and then the entire barge had to be moved around to the other side of the site and the other two corner batter piles driven. This resulted in a great deal of lost time, so the engineers designed new swinging leads which permitted the four corner piles to be driven from one position of the barge. This cut in half the time required for driving the four batter piles.

The Dredged Fills

The dredge "Hallandale" of the Arundel Corp. was used to pump in the 3,000,000 cubic yards of dredged fill for the causeway sections. The dredge has a 16-inch discharge and worked with a maximum 2,000-foot line most of

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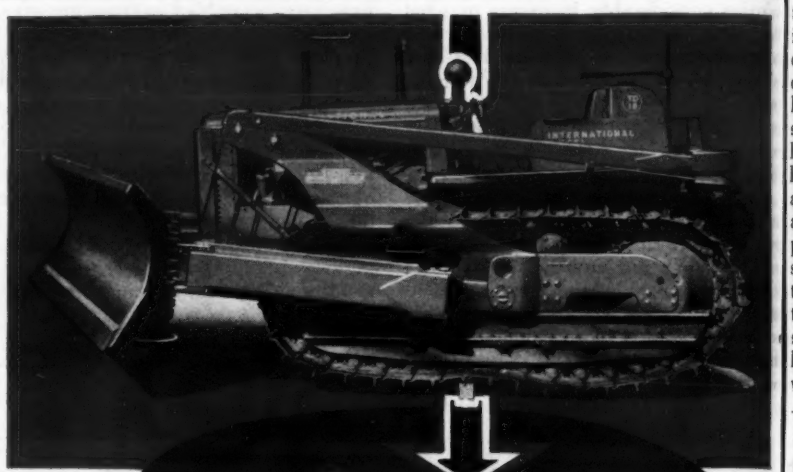

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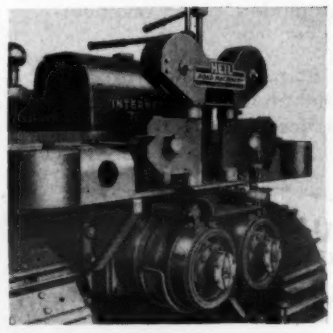
...assures ease of control and efficient operation
with the Heil Co.'s new
Cable Dozers
for International Harvester TracTracTors

The full power of your tractor drives on the blade — moving more "pay dirt" with each load — and there is no nosing down or rearing up, because the center of gravity has not been changed by the addition of the Cable Dozer. This is just one example of the thorough engineering which has accomplished perfect teamwork all along the line. Note operator's unobstructed view — convenience of controls (adjustable to his reach) — rugged side member construction. Send for bulletin describing many other features which assure you of cleaner, faster dirt moving at lower cost. R-19



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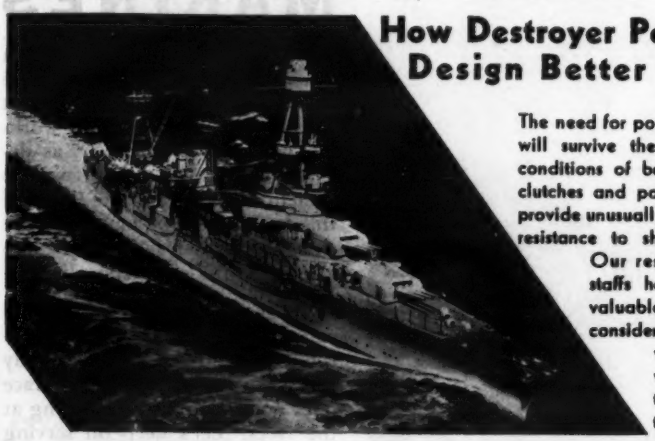

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Pullmore Multiple-Disc Clutches • Over-Center and Spring-Loaded Clutches • Power Take-Offs

Work on Causeway Suspended by WPB

(*Continued from preceding page*)

the time. The fill was placed 110 feet wide at the top with natural 16 to 1 slopes 120 feet wide in the water. The fill was carried to 7.5 feet above mean low water and will be topped later with an 8-inch compacted lime-rock base and paved 44 feet wide.

The borrow areas for the dredged fills have provided a new channel for fishing boats, saving a long haul through the old channel to the better fishing grounds in the bay.

Packing Up for the Duration

Since the work on the Rickenbacker Causeway is now at a standstill and the reinforcing steel on many of the columns is exposed, and the steel for the complete bascule span is on hand but cannot be erected, there has been much to do to protect the steel to maintain it in good condition for post-war use. The exposed steel on the piers has been covered with an asphaltic paint, and the bascule steel, formerly stored in the sheds at the Miami municipal docks, has been moved to a sheltered cove on Biscayne Key. A bulkhead was put up and filled with sand dredged from the adjacent area. The steel was then packed up carefully with just sufficient space between the larger pieces for men to move about to clean and spot-paint the steel and finally paint the entire surface with red lead. This was later housed for further protection. The steel which is to be encased in concrete when finally used, such as the counterweight tail piece of the bascule bridge, is protected only by painting with linseed oil.

Personnel

Earle M. Rader is County Engineer of Dade County, responsible for the prosecution of the work on Rickenbacker Causeway up to the point of "packing it up for the duration". Mr. Rader has been particularly active in post-war planning activities in the Dade County area and is Engineer for the Post-War Committee of the Miami Chamber of Commerce which is studying the possibilities of post-war work and gathering data on those projects that are in a condition to be placed under construction immediately after materials are free of wartime restrictions.

Heavy-Duty Models In Steering Gears

Steering gears for heavy-duty construction equipment, following closely the technique of automotive design with high efficiency and simplicity, are being produced by Gemmer Mfg. Co., 6400 Mt. Elliott Ave., Detroit 11, Mich. Gemmer steering gears are built on the worm and triple-tooth roller principle.

The worm is an hour-glass type providing wide angular movement of the pitman arm or roller shaft. The roller shaft is essentially a sector shaft, except that the triple-tooth roller replaces the ordinary sector teeth. When the worm is revolved, the roller revolves with it, eliminating the frictional losses of sector teeth. This also plays an important part in lubrication since the lubricant is distributed in operation in an advantageous manner. Even a diminished oil level cannot result in serious bearing-surface dryness.

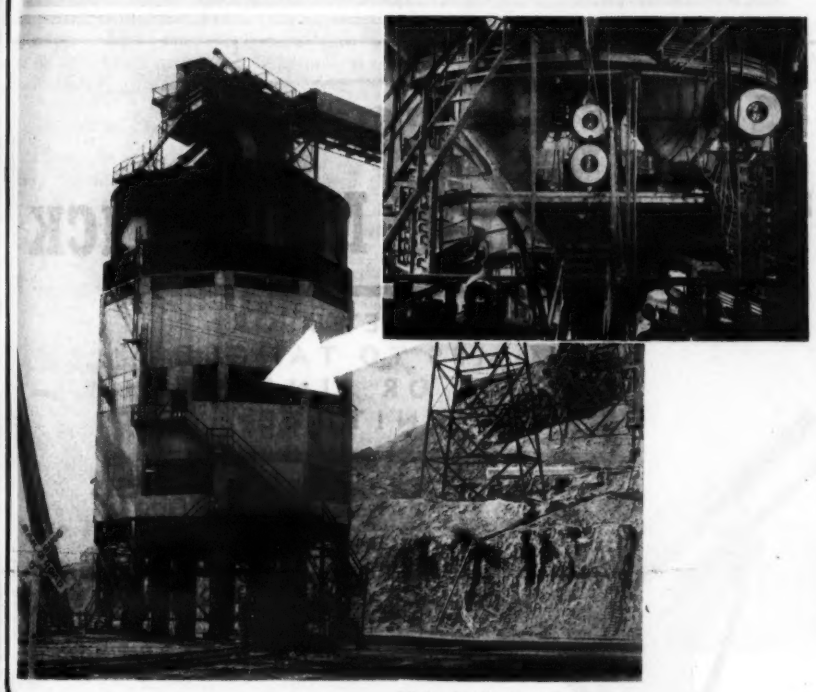
The roller-tooth shaft is mounted on the pitman arm side in special bronze bushings burnished to size and also in the heavy-duty models, on the outboard side in straight roller bearings. This latter is done to conserve space, as a bronze bushing at this point would require considerably more length for proper practice. Only the materials best fitted for each particular part are used, with a view toward stability, safety and durability. These models, capacity for capacity, are reported to be appreciably more compact than standard worm and sector steering gears weighing, in some instances, as much as one-third less.

Complete information regarding the Gemmer worm and triple-tooth roller steering gears may be secured direct from the manufacturer by those planning the design of post-war construction equipment or for replacement in groups of 10 or more pieces of similar equipment. Please mention this descriptive text in writing.

Mexico Opens Another Dam In Big Irrigation Program

Another milestone in Mexico's six-year irrigation program was reached with the recent opening of the El Azucar Dam on the San Juan River, 75 miles west of Reynosa, which will supply water to three irrigation systems in northeastern Mexico near the Texas border. More than 150,000 acres of arid land will be opened to cultivation.

The construction of El Azucar Dam is part of the six-year program begun in 1941 to irrigate an area of approximately 1,750,000 acres by 1946. Ten per cent of the national budget was allocated for this program. In 1926, the Mexican Government created the Mexican Commission on Irrigation which, between 1926 and 1941, developed irrigation on about 750,000 acres of land. Now about 10 per cent of the land under cultivation in Mexico is irrigated, and this percentage will rise with the completion of this program, aiming at a total of 2,500,000 acres of irrigated land.



Photos by The C. S. Johnson Co.

SPECIFY KRON

SPRINGLESS DIAL SCALES

on your

BATCHER PLANTS

for

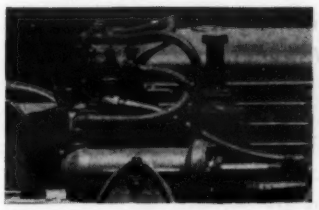
ACCURACY — SPEED — DEPENDABILITY

THE KRON CO.

Bridgeport, Conn.

Fast, accurate blade control with the sensitive, dependable Heil Hydraulic System

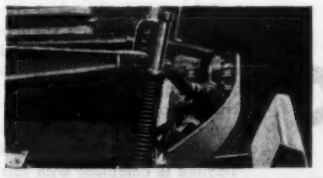
on Heil Bulldozers and Trailbuilders for Cletrac Tractors . . .



Troublefree Hydraulic System

Large diameter cylinders, permitting use of low hydraulic operating pressures. Piston rods are chromium-plated to avoid rusting and subsequent pitting.

Below:
Heil Hydraulic Pump, equipped with roller bearings for longer life. (Regularly rear-mounted — may be front-mounted.)



Efficient operation depends on instant response to a touch on the controls. That's what your operator gets with the Heil hydraulic system — whether it's rough, tough going among rocks and stumps, or he's doing a "smoothy" on landscape finishing. And he *keeps on getting* that same speed and accuracy, because this is the next thing to a perfect leak-proof unit. It stays in adjustment, gives minimum trouble through a long, hard life. Perfect balance, full visibility, many other Heil features assure you of full loads and bigger profits. Equip with Heil. Write for bulletins.

R-20

SEE YOUR CLETRAC TRACTOR DEALER

ARMY NAVY E

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1 WISCONSIN

The new Sullivan L-47 rock drill.

Easy-Holding Drill In 45-Pound Class

A new hand-held rock drill, which is claimed to have the drilling speed and power of a 55-pound drill and the easy-holding qualities of the average 35-pound drill, has recently been announced by the Sullivan Machinery Co., Michigan City, Ind. This new Sullivan L-47 is similar in design and construction to the L-57. The dual-valve construction gives complete control of the admission and cut-off of air to either end of the piston independently. Other features which are designed for efficiency and operator comfort include the wide-open exhaust away from the operator, a large oil reservoir, rubber-cushioned one-piece steel retainer, a shake-proof throttle-valve handle, and direct-to-steel airblast for adequate hole cleaning.

Further information on this new Sullivan hand-held rock drill may be secured by those interested direct from the manufacturer by mentioning this item.

Slide Rules Available

Announcement has just been made by the Frederick Post Co. of the availability of three new slide rules, one for professional draftsmen, one for the apprentice draftsman or student, and also a handy 5-inch pocket slide rule. All three of the rules contain the scales A, B, C, D, CI, K, S, L and T. The professional and pocket rules are celluloid-faced; the apprentice rule has a painted face.

The new rules have been produced as an emergency measure to meet the demand for this type of equipment. The manufacturer states that they are well-constructed and accurate, and they come equipped with a case and instruction sheet on the complete operation of the slide rule.

Further details may be secured by interested contractors, engineers, and draftsmen direct from the Frederick Post Co., Box 803, Chicago 90, Ill. Just mention this item.

"Too high commendation cannot be given to the administrative heads and the personnel of the state highway departments in continuing to expend every effort to keep highway transportation operating in the face of inexplicable limitations. This spirit of service devoted to the country's interest, emanating from the highway organizations, can and will be carried into the post-war period."
—Thos. H. MacDonald, Commissioner, Public Roads Administration.

Care of Canals Aided By Care of Equipment

(*Continued from page 46*)

canal which had to be cleaned of moss and a light accumulation of silt.

Structure excavation for checks is done by the machines rigged as clamshells. Since clamshell closing imposes severe wear on wire rope, which is none too plentiful in the District right now, preformed plow-steel rope is used for clam closing and load lines. Since the District adopted preformed wire rope for these services in 1938, it reports that cable life has increased remarkably.

Care of Equipment

Exact figures on cable life in the District are not available, but W. E. Hartzog, Superintendent of Water Distribution and Drains Construction, says that some of the credit for long life of cables and machines must be given to the operators out on each job. The District has kept its dragline and ditcher operators for a long time; most of them are men over the age to be called up for service in the armed forces; they have grown up in the valley and have a share in its prosperity. Perhaps this is the reason they cut canals precisely to grade, and treat their machines the way manufacturers wish everyone would treat them.

The District maintains a big equipment shop and yard next to its headquarters in Imperial. Here all major repairs, and many minor ones, are made. The introduction by the Army of the 8-hour unit as a basis of lubrication was nothing new for the District, as its operators and oilers have worked on that schedule for several years, lubricating each piece of equipment where needed after eight hours of service. The District rates no high priority, and the people of the valley consider it extremely important to keep their present machinery in tip-top shape.

Three years ago an earthquake cracked open canals, flattened levees, displaced check structures, and impe[r]iled the entire canal system along th[e] earthquake fault from Imperial dow[n] into Mexico. With its machines in A-[1] condition, the District was prepared t[o] meet the emergency. Working day an[d] night with draglines and bulldozers nearly 200 canals were put back int[o] shape in less than a week, and the crop[s] were saved.

WELLMAN Williams Type BUCKETS

Welded Rolled Steel

FOR GREATER STRENGTH AND LONGER SERVICE

Wellman Buckets combine all the mechanical advantages of the famous Williams Bucket with the welded construction features formerly found in Wellman custom-built heavy duty steel mill buckets.

Send for Free Bulletin

Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN-WILLIAMS.

Multiple Rope and Power Arm Types. Dragline • Power Wheel • Dredging. Special Service Buckets ⅜ to 16½ Yd. Capacities.

THE WELLMAN ENGINEERING COMPANY
7012 Central Avenue Cleveland 4, Ohio
SALES AND SERVICE AGENCIES IN PRINCIPAL CITIES

GEERPRES TANGLEPROOF MOP STICK

NO SCREWS OR CLAMPS TO TANGLE MOPS OR INJURE FURNITURE

AVAILABLE ON PRIORITY BASIS

★ EXTRA Long Life

★ Nothing to Wear Out

★ Will accommodate any size mop from a 16-oz. to a 36-oz., inclusive.

★ Automatic, self-adjusting Spring tension securely holds mop in place.

★ Write for further information concerning GEERPRES Mopping Equipment.

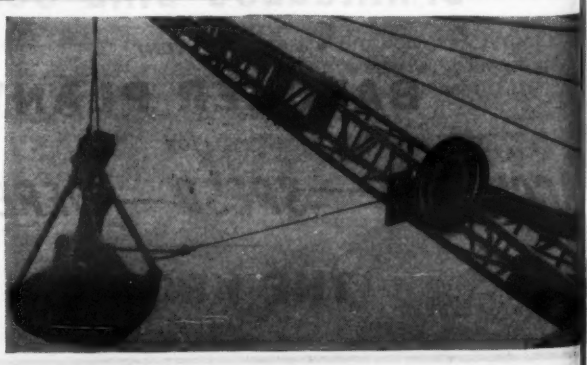
GEERPRES WRINGER, INC.
Muskegon 81, Michigan

RUD-O-MATIC foolproof TAGLINES

The Rud-o-Matic Tagline is operated on a spring principle and maintains at all times a positive tension sufficient to steady a clam shell bucket under any and all conditions, and will operate perfectly with the boom at any angle. It eliminates all the grief usually encountered with the average tagline as there are no weights, tracks, pins, carriages, or sheaves to wear out or to get out of order. Because of the large bearings and fewer sheaves, the saving on cable alone would eventually pay for it.

Tagline is complete with fair lead and cable attached and can be installed in less than one-half hour. Most of the crane manufacturers have adopted the Rud-o-Matic as standard equipment.

Manufactured by
McCaffrey-Ruddock Tagline Corp.
2121 E. 25th St., Los Angeles



Getting Most Service From Tractor Shovels

(*Continued from page* 54)

tie plate are securely fastened.

For use on equipment of this type on the various fighting fronts, the Corps of Engineers, U. S. Army, has reduced the number of lubricants to ten, three general-purpose greases, three engine oils, SAE-10, 30 and 50, an oil for chain and wire-rope lubrication, a wheel bearing grease, and two universal gear lubricants, SAE 90 and 80.

The Engineers' greasing period is 8 hours instead of one day, and this should be followed on all projects where the equipment is on a round-the-cl[illegible] schedule. In the Engineers Corps, the crew finishing an 8-hour shift lubricates all points indicated for once-a-day lubrication, and leaves the unit ready for operation by the next crew.

Job Layouts

There is a proper way to lay out the job for tractor shovels, just as for other types of equipment. This is particularly true for crawler-tractor shovels. It is a poor practice to push or crowd anything with the shovel more than 3 feet above ground level. When you are working against a high bank, as in a gravel pit, the materials should be loosened by dynamite or other means, so as to keep it running down to the grade. If you have a high bank to take down and room available, the best place to start is on the top, taking it down in 6 to 12-inch levels over the entire area to be excavated.

The work should always be laid out to provide the minimum turning of the tractor. This insures longer life for crawlers, track pins and bearings, track rollers, idlers and sprockets.

Some Service Suggestions

Here are some suggestions which may help to determine what is wrong if the shovels do not operate smoothly:

If the bucket will not "raise":	it may be that there is not enough oil; the pump intake line may be defective; PTO shaft or coupling splines may be stripped; operating valves may be defective; low pressure poppet is not seating; the controls are loose; there is dirt in the operating valve.
If the bucket will not hold:	there may be leaks in the hydraulic system; the operating valve may be defective with the high-pressure poppet not seating; there may be oil seeping past the piston rings.
If the oil overheats, it may mean:	the oil is diluted; a defective operating valve; a defective pump; a defective cylinder assembly; too heavy an oil is being used; piston and piston rings are worn.
A noisy system may result from:	a plugged intake oil line to pump; proper oil level in the reservoir not maintained; too heavy oil being used.
If oil leaks around the cylinder packing, look for:	a loose packing cover; worn or loose packing; piston rod scored or grooved; oil level in system too high.

New Maintenance Review

Volume I No. 1 of the Allis-Chalmers "Operation and Maintenance Review" contains a number of interesting articles on these timely and vital subjects of operating and caring for equipment in such a way as to keep it working at maximum efficiency. The first article in the booklet is on motors and drives, another discusses lubrication, and a third presents an arc-welding quiz.

In addition, there are many little items containing helpful hints. Take this one, on V-belts. "A loosely-held string snaps easily. On the other hand, it's a hard job to break a string that's held taut. It's the same way with a V-belt. If it's slack between sheaves and slipping intermittently, each time it grabs it's whipped back with a vicious jerk—straining it severely. But if it's taut, such jerks are impossible. A good check on correct belt tension: a slack V-belt feels dead when you thump it with your hand; a properly taut V-belt has an alive springiness."

Longer service from tractor shovels can be insured by proper care. Here the edges of the bucket on a Hough shovel are being hard-faced to extend the bucket's life.

Copies of future issues of the Allis-Chalmers Operation and Maintenance Review may be secured by interested contractors and state and county highway engineers direct from the Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Just mention this item.

Army-Navy "E" Awards

The following companies have recently received the Army-Navy "E" Award for excellence in production: The Blackhawk Mfg. Co., Milwaukee, Wis.; The Foote Co., Nunda, N. Y.; Koehring Co., Milwaukee, Wis.; the Caldwell plant of the Link-Belt Co., Chicago, Ill.; the Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., Passaic, N. J., which celebrated its fiftieth anniversary on the same occasion; and the Tarrant Mfg. Co., Saratoga Springs, N. Y. The second Army-Navy "E" White Star has been awarded to the Independent Pneumatic Tool Co., Chicago, Ill., and I. F. Laucks, Inc., Seattle, Wash., has received its first White Star, for continued outstanding production.

Serving with the Seabees ★

The Seabees—those tough and able men who carve airfields out of tropical islands, set up bridgeheads while enemy bombers drone overhead, and move equipment across rivers and canyons amid whining bullets—are among the foremost users of Bethlehem Wire Rope.

The Seabees are using Bethlehem Wire Rope on power shovels, cranes, hoists, dredges and on the many other pieces of equipment used in military construction. Hundreds of tons, millions of feet, of Bethlehem Wire Rope are going into ships' rigging, truck-winch cables, towing hawsers, Navy-yard dredges, mines, oil fields and war-plants. We are doing our best to produce more rope, better rope, faster.

★ ★ BETHLEHEM STEEL ★ ★ BETHLEHEM WIRE ROPE

Counties Stimulated By Alabama Road Bill

State-Aid Bill Effective October 1, 1943, Will Raise County Highway Standards; No Dissenting Votes

✦ SINCE 90 per cent of the highway mileage in Alabama is county roads, mostly only graded and gravelled, there was a need for some way to stimulate and improve the county road systems. To this end the 1943 State Legislature, without a dissenting vote, in June passed a bill effective with the start of the new fiscal year, October 1, 1943, which will insure the continuance of state aid and also will raise the overall calibre of county highway construction. The Act aims to increase the construction of county roads and bridges within the counties and outside the corporate limits of cities and towns and to improve the system of farm-to-market roads within the state.

The 6-cent state gas tax in Alabama is divided equally between the State Highway Department and the counties. The revenue from the 3 cents allocated to the counties is divided equally among the 67 counties for highway purposes. The income derived by each county from this source in the fiscal year which ended September 30, 1943, was approximately $112,000. Under the new county-aid law each county must operate its county road work on a unit basis and employ a registered civil engineer to have full charge of the county highways.

The new Act establishes within the State Highway Department a division called the Bureau of County Aid, with a Chief, appointed by the State Highway Director with the approval of the Governor, to administer the provisions of the Act.

Financing State-County Roads

In addition to the provisions mentioned above affecting the counties, they must set aside one cent of their share of state gas-tax money each year to be expended, with a like sum from the State Highway Department share of the gas-tax money, on county roads. No county may receive more than one sixty-seventh of the state money, but if a county fails to use the full one-third of its state tax money for construction on county roads in any one year, it loses that state-aid money, which reverts to the Public Road and Bridge Fund.

Under the provisions of the Act, the State-County Aid Fund must be used exclusively for the construction of county roads. The Court of County Revenues of a county by resolution makes application to the State Bureau for aid in the construction of certain county roads. This application may be approved or disapproved by the Chief of the Bureau. If approved, the county engineer then proceeds with the surveys and plans for the project and submits them with the specifications to the Chief of the Bureau for approval. In case the cost of a project in any one year is beyond the total of the county's and the state's contribution as required by law, the county may increase its contribution with the approval of the Chief of the Bureau. Costs are defined as including actual construction, the reasonable value of all engineering services exclusive of the services of the county engineer and including any services furnished by the State Highway Department, as well as the cost of all labor and materials, whether furnished by the State, the Highway Department, or by the county, and the reasonable rental value of any machinery or equipment used in the actual construction of the project. The cost of construction may not, however, include the interest on any money borrowed for such construction.

The county enters into a separate contract with the State Highway Department through the Bureau of County Aid for each project undertaken through the provisions of this Act. The work, whether done by county forces or by contract awarded to the lowest responsible bidder, is regularly inspected by the Bureau of County Aid. This includes all materials as well as the work of labor employed. Contracts for work are subject to approval by the Bureau but are executed between the county doing the work and the contractor only.

All right-of-way for work under this Act must be furnished by the county at its own expense, and it is not considered a part of the cost of construction. Money available for construction under this Act may be used to match Federal secondary road funds with the state and county sharing equally in the financing.

All roads constructed under this Act must be maintained by the county under contract with the state. This prevents a county taking advantage of the construction funds made available by the Act and then failing to maintain the road after it is built.

Beneficial Results

There are many counties in Alabama which have efficient highway departments already organized on the unit system. On the other hand, some counties have lagged behind in the construction of their county roads. It is for these counties in particular that the Act was passed, although it is of benefit to all counties inasmuch as it increases the amount of money available to each county for construction with the fiscal year beginning October 1, 1943.

Just as the Federal-Aid Act did much to stimulate the organization of state highway departments for more efficient operation, it is expected that the establishment of the Bureau of County Aid in the State Highway Department of Alabama will do much to further the construction of a greater mileage of higher-type county roads.

The Act was sponsored by the State Highway Department and the County Commissioners Association of Alabama.

Have you bought extra War Bonds?

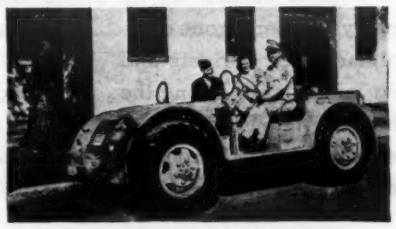
Directory of Engineers

The Biennial Directory of Registered Professional Engineers in the United States has recently been published by the Lewis Historical Publishing Co. This volume contains, in addition to the names and addresses of all professional engineers registered or licensed by state boards, a statement about the functions of the National Bureau of Engineer Registration, and a digest of the state laws governing the practice of professional engineering. Approximately 70,000 names and addresses are included with a geographical breakdown. The volume is officially verified and certified by the National Council of State Boards of Engineering Examiners, of which T. Keith Legare of Columbia, S. C., is Executive Secretary.

Copies of this Directory may be secured by those interested direct from the Lewis Historical Publishing Co., Inc., County Improvement Bldg., Eighth Ave. and 14th St., New York 11, N. Y. Price: $15.00.

The Original Jeep on maneuvers in 1940

Six-wheel Jeep pulling anti-aircraft gun


Sergeant O'Brien at the wheel of new four-wheel Jeep

THE *Original* "JEEP" ... a child of Minneapolis Moline

Current national publicity has obscured the fact that the first war machine named "JEEP" was born at Minneapolis-Moline and christened at Camp Ripley, Minnesota (with apologies to Ripley—"Believe it or not").

Back in 1938 Minneapolis-Moline engineers were already experimenting with the conversion of a farm tractor to an artillery prime mover; and in 1940, collaborating with Adjutant General E. A. Walsh, Commander of the Minn. National Guard, models were tested in maneuvers at Camp Ripley.

This new MM army vehicle was not a crawler tractor, truck nor tank, and yet it could do almost anything and it knew all the answers. Because of this, it brought to mind the Popeye cartoon figure called "Jeep" which was neither fowl nor beast, but knew all the answers and could do most anything. The National Guardsmen therefore named the MM vehicle the "Jeep". The "Jeep" name therefore is not a contraction of the term General Purpose (GP), and if it really had been, no doubt "Jeep" would have been spelled "Geep".

Since the original MM Jeep, Minneapolis-Moline has designed several additional models of Military tractors in cooperation with Army and Navy officials. Several models of MM Jeeps are now being produced in quantity for the Armed Forces of the United Nations, and in use throughout the world.

MINNEAPOLIS-MOLINE POWER IMPLEMENT COMPANY
MINNEAPOLIS 1, MINNESOTA, U. S. A.

Pump discharge from the hold during the raising of the U. S. S. Lafayette.

CMC Centrifugals Helped Salvage Job

More than forty CMC 10-inch centrifugal pumps played an important part in salvaging the U. S. S. Lafayette, the former French liner Normandie, by the Merritt, Chapman & Scott Corp. These 10-inch pumps, according to the Construction Machinery Co., Waterloo, Iowa, handled a large volume of the 100,000 tons of water pumped from the hull of the ship. Other centrifugal pumps in smaller sizes were also employed on the job.

Restoring Small Bridges With Open-Deck Flooring

Thousands of small county bridges can be salvaged by new flooring, according to F. H. Frankland, Director of Engineering of the American Institute of Steel Construction. Such an economical modernization might increase their life expectancy as much as ten to twenty years, Mr. Frankland declared.

Of the tens of thousands of such bridges throughout the country, thousands are obsolete in respect to floor systems; they are inadequate for modern highway loadings; stringers and floor beams often are in bad shape; and poor flooring frequently causes accidents, Mr. Frankland said.

He suggested that an economical replacement of floor surfaces for bridges would be open steel decking, pointing out that in sections where heavy snowfalls occur, this type of flooring would be particularly desirable. This open decking does not accumulate snow or ice, thus eliminating the possibility of skidding, and is light in weight, thereby reducing the dead load on the trusses of old bridges so that they may be widened or restored to the adequacy of modern heavy traffic.

Among the manufacturers of this type of flooring is the Irving Subway Grating Co., Long Island City, N. Y., which has furnished the flooring for more than 500 American bridges. Further information on Irving bridge decking may be secured by interested state and county engineers direct from that company.

Two New Appointments At American Car & Fdry.

Announcement has been made of two new appointments by the American Car & Foundry Co., New York City. Allen W. Clarke, formerly Mechanical Engineer in charge of the company's Western Engineering Division, has been made Assistant General Mechanical Engineer, with headquarters at St. Charles, Mo. Mr. Clarke has been associated with the company since 1905 and has served in a variety of positions.

W. F. Dietrichson, formerly Assistant General Mechanical Engineer located at the Berwick, Pa., plant, has been appointed General Mechanical Engineer at Berwick. Mr. Dietrichson, who was born and educated in Oslo, Norway, has been with a.c.f. since 1912.

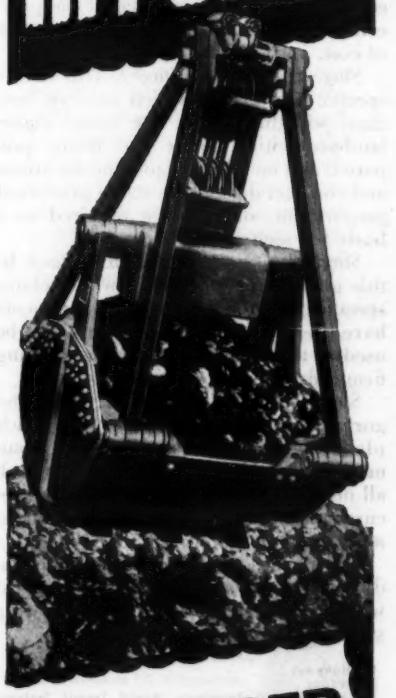
BUTLER EQUIPMENT *Helps Fight Our* GLOBAL WAR

From the Aleutians to South Africa, from the South Pacific to Russia's Arctic coast, Butler equipment produces the concrete and aggregates, and handles the material for a world at war. For Butler equipment is fighting equipment, built to take it and to *keep doing its job.*

Whatever your problem, call upon Butler engineers for information and assistance on ready mixed concrete plants, central mixing plants, aggregate plants, bulk cement equipment, batch bins, and the amazing little Carscoop. They are ready to work with you—day and night.

BUTLER BIN COMPANY
WAUKESHA, WISCONSIN

HAISS HI-POWER



FOR BIGGER PAYLOAD DIGGING

Engineered all the way through to do the job. Backed by fifty years of specialized manufacturing skill and experience. The pay-off bucket for better, more efficient 1943 work.

Haiss Hi-Power has the brute strength for heavy digging, and the power in its bite to yank loose an embedded boulder. Weight and closing power combine to dig deep and tear out a heaping bowlful at every grab. Alloy steel parts for abrasion resistance, long bearings for longer wear.

★ *Bucket agencies throughout the country. Write, wire for prices, delivery and catalogs.*

GEORGE HAISS MANUFACTURING CO., Inc.
Canal Place & East 142nd St., New York 51, N. Y.

CRANE FOR RENT

Speed-crane
Crawler-type
60-ft. boom

Address:
Box 242
Contractors and Engineers Monthly
470 Fourth Avenue
New York 16, N.Y.

Uniform Designations To Indicate Progress Of Post-War Planning

In order to establish some approved method of gauging the progress of planning for post-war construction, the American Society of Civil Engineers' Committee on Post-War Construction, G. Donald Kennedy, Chairman, recently adopted the following designations for the various stages to which such planning has advanced.

Stage I (Idea Stage). This category includes those projects known by name and description only, which are being visualized by various proponents or pictured in the form of sketches, but on which no basic engineering studies have been made.

Stage II (Report Stage). Included in this group are projects which have crystallized to a point where an engineering report is being or has been prepared, covering the scope and need of the project, general layout, preliminary estimate of cost, and similar data.

Stage III (Design Stage). This covers specific projects for which surveys, borings, soundings, etc., are being made, land-acquisition maps are being prepared, and on which plans, specifications and contract documents are in process of preparation, such as are required as a basis for securing bids.

Stage IV (Completed-Plans Stage). In this group are projects on which plans, specifications and contract documents have been completed and laid aside to be used at the opportune time for securing firm bids.

Stage V (Bidding Stage). This category contains all projects on which plans, specifications, and contract documents for bidding have been completed, all necessary rights-of-way have been secured, and the necessary funds have been authorized and allocated.

For purposes of tabulating and subdividing the various classifications of work, when so desired, the following subdivisions are recommended:

1. Highways
2. Bridges
3. Railroads and Terminals, Rapid Transit Systems, Subways
4. Airports, Terminals and Landing Strips
5. Pipe Lines, Oil and Gas
6. Power Generating and Transmission Systems
7. Municipal Improvements (Streets, Sewers, Water Supplies, Parks, Etc.)
8. Public Buildings, Schools and Hospitals
9. Commercial and Industrial Buildings
10. Housing
11. Waterway Improvements (Dams, Docks, Locks, Port Harbor and Channel Improvements)
12. Flood Control, Irrigation, Drainage, and Reclamation
13. Military Projects
14. Foreign Projects

It is believed that such a standardization of terminology in connection with post-war planning will serve to clarify the present situation in which it is impossible to determine from a statement about post-war planning whether the plans are in the "Idea" or "Bidding" Stage. The Committee on Post-War Construction of the American Society of Civil Engineers will welcome comments and criticism on these designations, with the hope that some uniform terminology for the various phases of preparation for post-war construction can be established.

A New Metal Cleaner Used Before Repairs

An emulsifiable-type cleaner designed for the quick removal of oils and solid-particle dirts and greases, especially those which are very hard and caked on, has been developed by the Technical Processes Division, Colonial Alloys Co., Colonial Philadelphia Bldg., Philadelphia 34, Pa. This Running Gear Hydrocarbon Cleaner is used for metals in general, and for road machinery, tractors, and other construction equipment prior to repairs or refinishing. The manufacturer reports that many applications which will not respond to alkaline cleaning are handled readily with Running Gear, with the added advantage that it is not harmful to any metals. When used alone without a subsequent water bath, it removes thin oil and grease film.

In using Running Gear, one part of the cleaner is added to from three up to ten parts of kerosene or common mineral spirits, depending upon the severity of the cleaning job on hand. It is used at room temperature and sprayed on or the part is dipped into a tank of the solution. It is allowed to soak from ½ minute to 30 minutes, depending on the cake. The part is then allowed to drain off, is flushed with a pressure hose, or a hot water or steam dip. Emulsification takes place rapidly so that the dirt and greases are loosened and suspended and flushed away, leaving the surfaces clean.

Complete information regarding this method of cleaning metal parts prior to inspection and repair may be secured direct from the manufacturer.

ALL TRAILERS ARE NOT ALIKE!

Ask the salesman these questions!

- Are the beams strong enough to carry the rated load without sagging after several months' service?
- Does the frame have enough cross members?
- Are the bearings, axles, and wheels of ample size and weight to carry the occasional overload and stand up under road shock?
- Are the radius rods, brake cross shafts and other points requiring lubrication bronze bushed?

These are just a few of the things to check before planning on your post-war trailer. But before you buy any trailer, check into the exclusive design of Jahn Trailers.

JAHN Heavy Duty TRAILERS in Capacities from 5 to 100 TONS

C. R. JAHN COMPANY

1347 W. 37th Pl., Chicago

"Come to Trailer Headquarters"

PMCO

WELDED DIPPERS

. . . engineered to take full advantage of the weight saved by welded construction, increasing shovel capacity as much as 25%.

. . . makes possible the use of long booms without reducing the dipper size.

. . . are reinforced for maximum strength, with a proven ability to stand up under the toughest digging conditions.

Small and medium size PMCO dippers now manufactured on a production line basis

We operate the largest and most complete manganese steel foundry in the United States.

PETTIBONE MULLIKEN CORPORATION

Established 1880

4710 West Division Street, Chicago 51, Illinois

Indiana uses Prismo beads to reflectorize its pavement signs at railroad grade crossings as well as for its traffic stripes indicating no-passing zones. (See C. & E. M., November, 1943, pg. 18.)

Andean Road Blasted Through Solid Rock

A stretch of 5½ miles over the Western Cordillera on Colombia's 83-mile national highway being constructed between Cali and Buenaventura, on the Pacific Coast, is the toughest road construction job now going on in that country and probably in South America, according to a recent report from the Office of the Coordinator of Inter-American Affairs. The road must be blasted through solid rock nearly all the way, and it is anticipated that it will be the end of 1944 before a motor highway can be cut through this mountainous terrain. The gap is about 57 miles west of Cali.

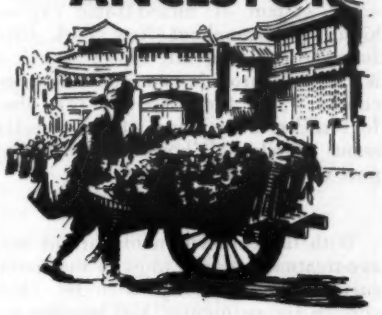
This gap is one of four on which Colombia is centering her road-building efforts, since, until the road is finished, all shipments of coffee and other products from the interior destined for the seaport of Buenaventura must be transported by railroad, then by truck, and then transferred to the railroad again to reach the coast.

Of the three other gaps, two are on the highway between Medellin and Bogota, the capital, and the fourth gap is on the 76-mile route between Pavarandicito and Turbo, on the Gulf of Darien, on which work is also under way. Pavarandicito is on the Pan American Highway route between Medellin and Panama; consequently, the completion of this road to Turbo will provide a link with the Pan American Highway from the Caribbean long before a motor road through southern Panama is finished.

Until 1930, Colombia depended mainly on the water transportation afforded by rivers. Then the construction of highways and railroads was begun at many separate points. Now the nation is embarked on a program of coordinating the various projects.

ECONOMY STEEL FORMS

HATS OFF to this Sterling "ANCESTOR"



Centuries ago, the Chinese were the first to apply the principle of the wheel to the wheelbarrow and it soon became the most widely used freight conveyance in China for hauls up to 10 miles. The load was placed *above* the wheel. Only a little weight was thrown on the user's arms.

Today, Sterling Wheelbarrows continue to apply that same labor-saving principle. Sterling sturdy, balanced construction puts 80% of the load on the wheel, thus easing the task of the operator and making it possible for him to haul *more loads per day.*

While only a few Sterlings are available for the Duration, we hope to manufacture more immediately after the war.

STERLING Wheelbarrow Co.
Milwaukee 14, Wisconsin

Sterling S
Look for this Mark of STERLING Quality
WHEELBARROWS

A 4264-½

REPRESENTATIVE WANTED

A young, or energetic middle-aged man experienced in construction machinery sales, by a responsible road machinery manufacturer. Must have ability to direct a sales force and handle distributors.

If interested, write

BOX 243

Contractors and Engineers Monthly
1719 Daily News Building
Chicago 6, Illinois

giving qualifications, experience, references, age, draft status and compensation expected, in first response.

New York City Program For Needed Facilities

(*Continued from page 59*)

with the use of state funds.

Express Highways

Progress is also being made by various city agencies in planning a coordinated system of mixed-traffic express highways throughout New York City. In some respects, Mr. Moses stated, it is easier to provide continuous uninterrupted travel for passenger cars than for trucks, buses, and other miscellaneous vehicles, all however constituting part of the same problem.

Recreational Facilities

With the completion of various sewage-treatment plants, most of the waters surrounding the city will be clean enough for swimming, and beaches and swimming pools are being planned, as well as parks and playgrounds. Wherever possible, some park use of lands acquired for sewage-treatment plants is agreed on with the Department of Public Works.

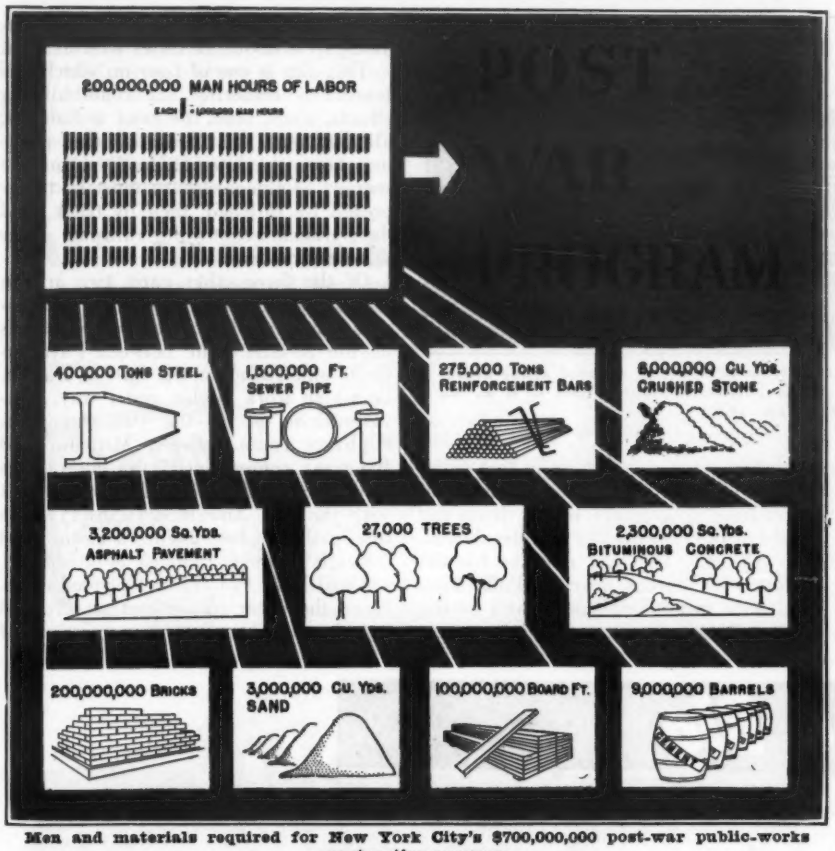
In connection with the ten new state public housing projects planned for post-war construction, the recreation needs of the neighborhood as well as of the project residents will be taken care of as part of the projects.

In addition, most of the museums and city institutions under the jurisdiction of the Department of Parks are being replanned.

Men and Materials Needed

Mr. Moses concludes his article with an interesting summary of what this vast post-war program means in man-hours of labor and materials.

Arrangements were made with the General Contractors' Association and large corporations vitally interested in the program to study it and break it down to determine the number of man-hours involved and the material and equipment required. In computing the man-hours, no attempt was made to go back of actual construction; in other words, the figure given does not include the man-hours in the mines and factories to produce the materials and equipment involved. The program as presently conceived will require over 200,000,000 man-hours of labor, which Mr. Moses says should make a sizable dent in the city's unemployment problem.



Men and materials required for New York City's $700,000,000 post-war public-works construction program.

The jobs will require 400,000 tons of structural steel; 275,000 tons of reinforcing bars; 9,000,000 barrels of cement; 100,000,000 board-feet of lumber; 6,000,000 cubic yards of crushed stone; 3,000,000 cubic yards of sand; and will involve 3,200,000 square yards of asphalt pavement and 2,300,000 square yards of bituminous-concrete.

The production and transportation of this material and the equipment required for this program will create employment not only in New York City, but all over the country, Mr. Moses pointed out.

Koehring Appointments

At a series of regional sales conferences held recently by the Koehring Co. and its subsidiaries, Kwik-Mix Concrete Mixer Co., Parsons Co., and the C. S. Johnson Co., at Roanoke, Va., Atlanta, Ga., Dallas, Texas, Salt Lake City, Utah, and Chicago, Ill., announcement was made that J. R. Steelman, Vice President of Koehring, is now in charge of sales of all the companies. George J. Dimond is in charge of Koehring sales, A. E. Kelbe in charge of Kwik-Mix sales, H. J. Holdsworth in charge of Parsons sales, and J. F. Robbins, of Johnson sales.

Reports on Accidents On Construction Jobs

The annual pamphlet "Accident Rates in the Construction Industry" covering 1942 accident experience in that field has just been issued by the National Safety Council. The reports cover 290 construction organizations, the largest number ever received by the National Safety Council, and show 17.36 reportable injuries per 1,000,000 hours worked. Severity rates averaged 2.26 days per 1,000 hours worked. The 1942 frequency rate was down 33 per cent from 1941; there was no change in the average severity rate.

Although the outstanding feature in the 1942 experience of the construction industry was the large decrease of 33 per cent in frequency from 1941, construction's 1942 frequency rate was 18 per cent above the average for all industries, and its severity rate 51 per cent above the general average. The relatively high severity rate is partly due to frequent serious injuries in steel erection, earth dam and tunnel construction. The severity rates for steel erection were particularly high, averaging 24.51 for the past three years, while the average rates for earth and tunnel work remained at about the same level, 7.15.

The pamphlet also contains analyses of the circumstances and causes of accidents, and a large amount of statistical data on accident experience in various types of construction. Copies of this pamphlet, which should be studied carefully by contractors, engineers and safety men in an effort to lessen the accidents in the industry, may be secured direct from the National Safety Council, 20 No. Wacker Drive, Chicago 6, Ill. Just mention this magazine.

. . . are the choice of those who want JACKSON standards of quality, dependability and performance. No other flexible shaft vibrator can offer such assurance.

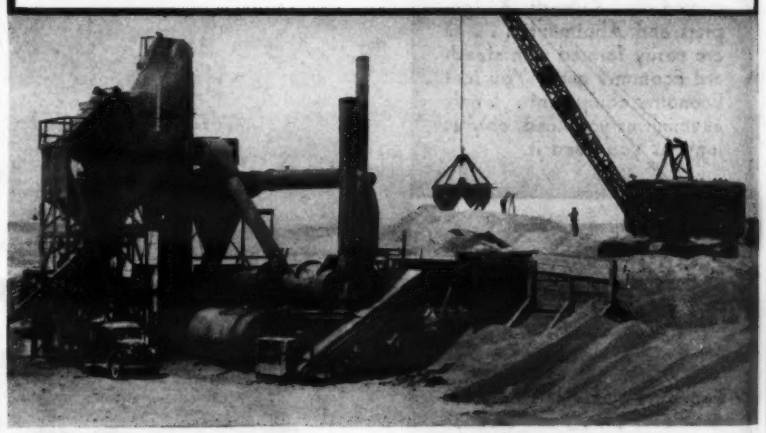
Supplied with a 2⅜" and a 1¾" head. These two heads give user a vibrator efficient in and suitable for a wide range of applications. For instance, from wall sections of comparatively large size to narrow sections.

Model FS-6A, illustrated above, is furnished complete with 7, 14, 21 or 28 feet of shaft. Has dirt-proof turntable base. Supplied with or without wheelbarrow mounting.

Write, wire or telephone for further information

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

HETHERINGTON & BERNER
ASPHALT PLANT AVERAGES
Over 100 Tons Per Hour



THE "Brass Brain" (FLUIDOMETER)

This automatic metering system saves time, materials — insures uniformity. For all types of plants.

● In spite of dust storms which necessitated frequent shut downs, this H & B asphalt plant did a real job for its owner, S. Birch & Sons Construction Co., of Great Falls, Montana, on a big northwestern air base project. For one five-day period the average hourly asphalt production was 115 tons.

This production is typical of the way in which H & B plants are helping speed the construction and maintenance of roads and bases that are vital to victory. Literature describing the complete line of H & B portable and stationary asphalt plants will be sent on request.

HETHERINGTON & BERNER Inc.
INDIANAPOLIS 7, INDIANA

Hetherington & Berner

C. & E. M. Photo
Two tows approaching the clamshell dredge Conical from the west on the Intracoastal Waterway at the site of the Isle Maronne cut-off.

Waterway Improved By Leased Dredges

(*Continued from page 60*)

of dredge pipe, either pontoon or land lines, the rate of pay is reduced to 80 per cent. This is an incentive to the dredge operators to reduce the "down time", caused by shifting lines, to the very minimum and to eliminate as much lost time caused by passing tows as possible by starting the dredge promptly when a tow has passed. The "down time" is checked on the dredge log by the U. S. Engineer Department inspectors aboard each dredge. There is a chief inspector and three shift inspectors. The development of the "spill barge" to eliminate the use of long discharge lines has greatly reduced the time lost in shifting shore lines and cutting in and out the pontoon sections.

Production

The nine dredges working on the enlargement of the Intracoastal Waterway within the New Orleans District west of of the Mississippi between August 15 and August 31, 1943, a period of two weeks, advanced 48,510 feet and excavated 1,568,099 cubic yards of material from the box section. In this same 272-mile section a total of 14,895,000 cubic yards was pumped between December 26, 1942, when the work was authorized, and the end of August, 1943. In this same period 11,612,000 cubic yards was pumped from dredging operations in the 30 miles east of the river in the New Orleans District.

During the period August 1 to 15, 1943, the average production of the various dredges visited, and whose work will be described in other articles which will appear in subsequent issues, was as follows:

Dredge	Owner	Work in 24 Hours Excavation Cubic Yards	Advance Feet
G. A. McWilliams (Hydraulic)	McWilliams Dredging Co., New Orleans	18,935	686
Conical (Clamshell)	Sternberg Dredging Corp., New Orleans	4,190	164
Tchefuncta (Hydraulic)	Jahncke Service, Inc., New Orleans	6,398	211
Mobile (Hydraulic)	Atlantic, Gulf & Pacific Co., New York	13,107	424
Miami (Hydraulic)	Standard Dredging Corp., New York	17,221	675

Personnel

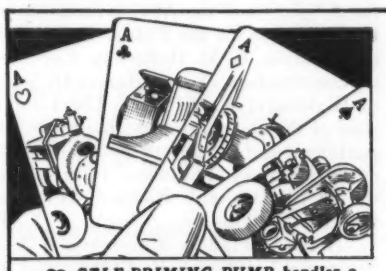
The enlargement of this section of the Intracoastal Waterway is being completed under the direction of The District Engineer, New Orleans District, U. S. Engineer Department.

Renewed Bucket Teeth

To insure full payloads, the digging teeth of shovel dippers must be sharp and in good condition. Dull teeth cut down production and waste power. Allied Steel Products, Inc., N. B. C. Bldg., Cleveland 14, Ohio, has developed Mango repointer tips for the purpose of renewing dipper teeth and thus restoring or extending the efficiency of excavating equipment.

Mango cast wedge points are made from Mango bars which are available in four sizes of points, each in 42-inch bar lengths. Sections of the correct width are torch-cut from the bar, tacked on, filled in where necessary, and hard-faced, if desired, with welding electrodes, as illustrated in a folder available from the company. The manufacturer states that Mango cast wedge points will withstand impact and abrasion as well as new cast manganese teeth, and that their use saves time, money and metal.

In addition to rebuilding dipper teeth, Mango is equally suitable for dragline, ditcher, trencher, road ripper and scarifier teeth, and may also be used for build-up welding where large amounts of impact and abrasion-resistance metal are required.



ACES

As hard to beat as four aces, that's Novo Equipment!

You gamble every time you bid on a contract. After you get a contract, your best bet is good equipment. Equipment that will do the job no matter what the odds. Equipment like Novo Engines, Pumps, Hoists and Generator-Sets.

♡ *SELF-PRIMING PUMP handles a lot of water in a short time.*
♣ *GENERATOR-SET makes power and light on your job.*
◇ *HOIST takes the IF out of lifting.*
♠ *DIAPHRAGM-PUMP handles water heavy with mud, debris, and sludge.*

Every piece of Novo Equipment is backed by over forty years of successful manufacturing. For your protection, it has been job-designed, factory-tested, and field-proven. When the chips are down, it will come through in the pinches!

Remember, when you have Novo Equipment, you hold the Aces.

We are currently in production on all items illustrated at the right. While most of our production is reserved for the Armed Forces, we can make limited shipments to Civilians with proper Priority.

Also a member of A.E.D.

Diaphragm and Pressure Pumps

Generator Sets

Hoists

Self Priming Pumps

Pavement Breakers

Engines

NOVO ENGINE COMPANY LANSING, MICHIGAN

The DIXON *Line* . . . HOSE COUPLINGS, NIPPLES, MENDERS, CLAMPS, VALVES

Here are some of the leaders in "The Quality Line" of industrial hose fittings . . . known to Distributors and their customers from coast to coast for long, reliable service in every field.

"G J-BOSS"
Fem. Coupling, X-34
For steam, air liquids. Washerless, leak-proof. Ground joint construction provides permanent soft-to-hard metal seal. Furnished with powerful "BOSS" Offset Interlocking Clamp, ⅛" to 4".

"BOSS"
Fem. Coupling, W-16
More widely used than any other make. Washer type—otherwise same as above, ¼" to 4".

"BOSS"
Male Coupling, MX-16
Companion coupling for both of above. Same efficient clamp. More economical than standard I.P.T. nipples. ¾" to 4".

"DIXON"
Air Hammer Coupling
Washer type. For all pneumatic tool service. Efficient, durable, inexpensive. Compact and heavy types. Also available in ground joint construction —"G J-DIXON".

"G J-BOSS"
Air Hammer Coupling
For heavy duty and hardest wear. Ground joint, washerless construction. Furn. with strong mall. iron "BOSS" Interlocking Clamp. Also available in washer type—"BOSS". Compact and heavy styles.

"AIR KING"
Quick-Acting Hose Coupling
Universal type, with pat. safety locking arrangement. Hose ends: male and female pipe ends.

"DIX-LOCK"
Quick-Acting Air Hose Coupling
With renewable sleeve and spring. Snaplock action. Hose ends: male and female pipe ends.

"KING"
Combination Nipple
Fits straight end hose. Pat. "Cor-o-Zig" shank is easier to insert, provides stronger gripping surface. ⅛" to 8".

"KING"
Shank Coupling
For suction and water hose, strong, durable, convenient. Heavy and light patterns. 1½" to 8".

"KING"
Single Bolt Clamp
Strongest of its kind, and easiest to attach. Broad bearing surface conforms readily to contour of hose. ⅞" to 5¼".

"KING"
Double Bolt Clamp
Quadruple take-up feature gives superior gripping power. Full-width, double-tongue saddles. Strong, durable, easy to attach. 3½" to 17¼".

"BOSS"
Self-Honing Air Valve
Combines all features desired in valve of this type, plus built-in handle that can't come off. Self-adjusting, quick-opening, full flow. Male both ends or female both ends.

IF IT'S A DIXON BOSS PRODUCT IT'S DEPENDABLE

DIXON VALVE & COUPLING CO.

Main Office and Factory
PHILADELPHIA, PA.
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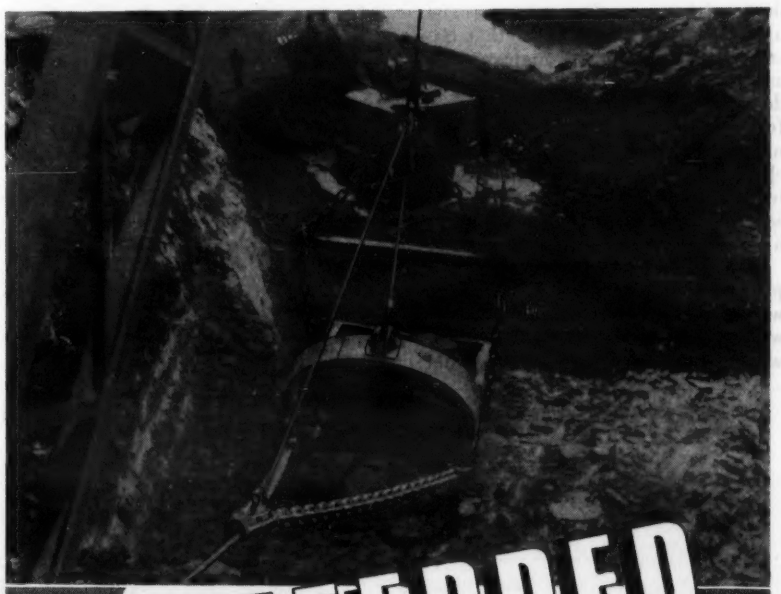


PREFERRED BY COAL STRIPPERS

Why? Because Page AUTOMATIC Dragline Buckets dig—through soapstone, shale and blasted rock. They DIG—and yet they clean off the coal without tearing it up, the AUTOMATIC Digging Action—plus—Page CONTROL.

Write for details without obligation

Page Automatic DRAGLINE BUCKETS

PAGE ENGINEERING COMPANY
c/o Clearing Post Office, Chicago, Ill.

Plans to Expedite Post-War Road Work

(*Continued from page 67*)

connection with work on plans for highways and bridges in Indiana. At the present time, a number of students are working six afternoons a week in plotting cross sections, etc. Thus the students not only help to make up the manpower shortage in the engineering forces of the state highway department but, at the same time, earn needed income for themselves and gain practical experience.

Much interest was expressed by the highway officials present at the committee meeting in this use of college students.

Present Status of Plans

In some states, the acquisition of needed rights-of-way is still a very slow process, because of antiquated legal machinery. The only remedy is legislative action in the various states where it would be advisable to follow as soon as possible the example of those states where procedure for right-of-way acquisition has been streamlined. Unless rights-of-way are available when needed, the best-laid plans for a highway program will be held up indefinitely while right-of-way acquisition goes on.

The committee agreed that highway improvements and betterments, that is, new highway construction, will be at a minimum until the war in Europe is ended. This means that the longer the war lasts, the worse the condition of existing highways will continue to grow. It is therefore probable that at the end of hostilities, or even before that date, the need for reconditioning our existing highways will be so urgent that an accelerated program of highway repair and reconditioning will have to be undertaken. Such a program, continued for a period after peace is declared, might provide the time for the more elaborate and time-consuming engineering and rights-of-way measures necessary for the more ambitious post-war highway projects, it was pointed out.

The post-war highway reconstruction program looms largest in the states where road pavements are oldest, and it was acknowledged that the greatest post-war highway problem will be that of providing better means of getting into and out of our metropolitan areas.

The highway officials present at the meeting were emphatic in their endorsement of the contract system for highway work.

The Committee

This Joint Cooperative Committee of the AASHO and the AGC is made up of H. K. Bishop of the Public Roads Administration, C. M. Hathaway, Engineer of Construction of the Illinois Division of Highways, W. W. Mack, Chief Engineer of the Delaware State Highway Department, and E. L. Roettiger, Wisconsin State Highway Engineer, representing the AASHO; and Richard Hopkins, Richard Hopkins Co., Albany, N. Y., F. C. Nelch, Sangamo Construction Co., Springfield, Ill., W. P. Roscoe, W. P. Roscoe Co., Billings, Mont., and D. W. Winkelman, D. W. Winkelman Co., Syracuse, N. Y., representing the AGC. Mr. Hopkins is Chairman of the Committee, and Harry J. Kirk is Secretary.

U. S. Highway System Sets Freight Record

America's highway transportation system established an all-time high in freight-hauling during 1943, in spite of severe handicaps, and in so doing took up much of the slack in railroad facilities, according to F. F. Staniford, President of Mack International Motor Truck Corp.

Compared with World War I, when in 1918 America's transportation collapsed and the Federal government took over the railroads and imposed immediate freight embargoes, the U. S. transportation system is still holding up under the strain of the present conflict as we enter our third year of war. Part of the reason for this, Mr. Staniford said, is that our railroads are moving more freight with less equipment than they did in the last war. But the main reason is that our country has nearly 5,000,000 trucks on the job today, compared with 350,000 in 1918.

These 5,000,000 trucks are averaging 10,000 miles annually for a grand total of 50,000,000,000 miles a year. In rolling that distance in 1942 they hauled 60,000,000,000 ton-miles of freight, and passed that mark in 1943. This record haul was carried over 300,000 miles of inter-city hard roads, as compared to approximately 5,000 miles of inter-city hard roads in 1918.

Even while our on-rubber transportation system set a new record, shortages of parts and equipment cut into the volume of freight which the Office of Defense Transportation had estimated the motor carriers would haul in the latter half of 1943, Mr. Staniford stated.

New District Sales Manager

Announcement has been made of the appointment of Harvey A. Craig as District Sales Manager for the Republic Steel Corp. in the Los Angeles district. Arthur C. Gelder will serve as Assistant District Sales Manager in that territory.

ARMY E NAVY

★★ Immediate delivery on Gasoline Powered 1½ H.P., and wheelbarrow or round base mounted 3 H.P. units on suitable priority.

Easily Carried By One Man

1. Place a stiffer mix and save sand, water and cement.
2. Eliminate expensive hand patching after forms are removed, because MALL vibrated concrete is free from honeycombs and voids.
3. Use less labor.
4. Finish work faster and get stronger, water-tight concrete.
5. Strip forms earlier and release form boards for other use.
6. Reduce power and maintenance costs.
7. Variable speed engine operates 8 other tools eliminating need for separately powered tools.

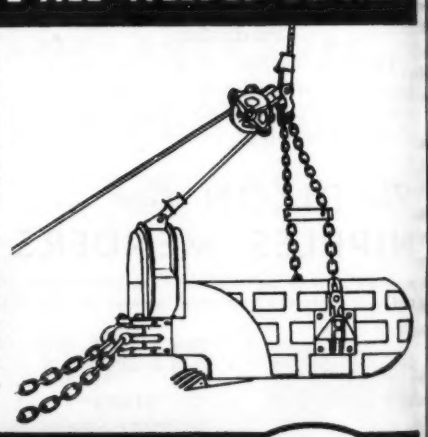
Write for literature and prices.

MALL TOOL COMPANY
7743 SOUTH CHICAGO AVE., CHICAGO 19, ILLINOIS

YAUN'S BASKET TYPE ALL-WELDED BUCKET

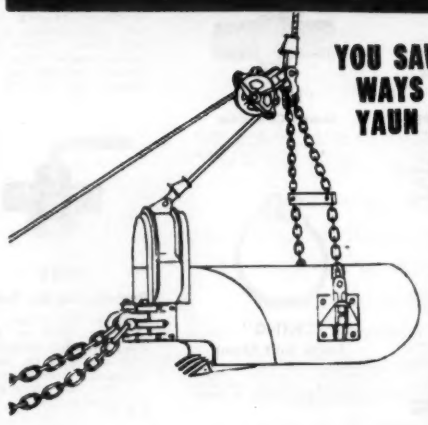
YAUN'S basket type bucket is an innovation in the digging field. It is a duplicate of the shell type, except that the rear is made of heavy flat bars, instead of sheet steel. When handling wet dirt, there is no suction to hold back the discharge. It is designed to handle any loose material, except "soup." The dirt does not fall through the holes.

This basket type bucket has the same arch as the shell type, which is proof against distortion—you'll never see a Yaun Bucket with the front "caved" in. The lip is also stellited, which makes it last longer and has the same connection between arch and lip as the shell type. These buckets are equipped with American manganese tooth bases with removable tooth points.



YAUN'S SHELL TYPE ALL-WELDED DRAGLINE BUCKET

Some Advantages of BASKET-TYPE BUCKET
100 per cent load in sticky dirt
Fill will dry quicker.
Machine will be subjected to less strain.



YOU SAVE THREE WAYS WITH A YAUN BUCKET:

1. More pay load, less bucket weight for same gross weight, more yard per cycle at same cost.
2. Faster dumping means more cycle per shift at no additional cost.
3. Less dead weight to swing back, empty faster, return and more cycle per shift at no additional cost.

YAUN'S shell type bucket is furnished with American manganese tooth bases and removable tooth points. The bottom of the lip is stellited and as the top wears, the bottom remains and causes the lip to become exceedingly sharp. The lip is guaranteed to remain sharp during the life of the bucket. The arch is so constructed that it adds strength and durability to the front end.

The weight of this bucket is about one-third lighter than that of any other bucket of similar capacity, yet you'll find it will last longer. This will naturally enable you to move from 30% to 50% more dirt at no increase in cost—often the difference between profit and loss of a job.

Patented

YAUN DRAGLINE BUCKETS & MFG. PLANT
BATON ROUGE, LOUISIANA

CONTINENTAL DIVIDE, TWO MILES UP

One of the LINN HAFTRAKS used on the difficult terrain of the Inter-American Highway.

THE LINN MANUFACTURING CORPORATION
MORRIS, NEW YORK

Methods of Solving Ice-Hazard Problem

(*Continued from page 63*)

veyor. All operations are controlled by a man riding with the truck driver in the heated cab. The feeder and spreader are operated by a separate gasoline motor.

To protect the public, as well as the sanding crews, the trucks should be well lighted at night (C.&E.M. February, 1939, page 5). The Highway Research Board Sub-Committee recommends that, "A distinctive group of cluster lights should be placed on all sanding and snow-removal equipment. Reflectors should be provided on the rear of the cab, the rear of the body, and, if necessary, on the spreader. Removable handrails should be provided for the sides of the body to protect the men. Bombs or lanterns should be hung from the tailgate. A flashing red light with a 10-inch lens mounted on the telescopic bracket and attached to the left rear of the cab should be standard equipment on all plowing and sanding units."

Using Straight Chloride

At least two states, New Hampshire and Ohio, are using dry chloride applied directly to the road surface. The report, in discussing this method, says, "There is often a period immediately following a snowstorm when the temperature is at its highest level before falling. During this period there is a considerable amount of moisture both in the air and on the road surface.

"An application of from 300 to 500 pounds of chloride per mile of two-lane roadway, spread for about 2 feet along the center line, will form a solution which will prevent the formation of ice on the pavement. Under severe conditions it might be advisable to use chloride up to 0.05 pounds per square yard distributed over the entire roadway width.

"The chloride can be applied through the regular spreader if the truck travels fast enough and the disks are detached. It also can be spread directly through the tail-gate. A special dispenser can be made, using a funnel-shaped metal hopper at the elevation of the back of the truck, with a 2-inch pipe running to a flared plate set about 9 inches from the road surface.

"This method is particularly adaptable during sleet or light snow storms which occur when the temperature is just below freezing and continue for some time."

Canadians Discuss Post-War Highways

Employment of many thousands of returning men from the armed services and workers from war industry will be provided in the readjustment period following the war by a program of highway construction and development, the Hon. A. T. Procter, Minister of Highways and Transportation, Province of Saskatchewan, and President of the Canadian Good Roads Association, declared in his presidential address at the annual meeting of the Association held recently in Calgary.

Ministers of highways and public works and their deputies from all nine Canadian provinces attended the meeting which was devoted mainly to discussion of plans for the post-war development of Canada's highway systems. *Engineering and Contract Record* reports that the provincial delegates sought, during the two-day session, to coordinate their plans in such a way as not only to provide the maximum of employment for returned men and workers now engaged in war industry, but to insure the best possible development of the country.

During the past three years, road building in Canada has been more or less at a standstill, and the deteriorating effects of inadequate maintenance are to be found in many sections of the country, it was pointed out. Mr. Procter stated that details are now being worked out so that provincial highway departments will be ready to go into action immediately when it is considered advisable to do so in the reconstruction period.

"A survey of the road-building programs being developed by our provincial governments," Mr. Procter stated, "shows them to be the most comprehensive ever planned in the history of Canadian road building."

• LIKE the Heavy Pattern Gar-Bro Shimble, the Regular Pattern is forged from mild steel bars to provide rigid support for wire rope in correct, non-collapsible contour, thereby insuring better rope protection, greater strength for direct pull, and adaptability in use. This fitting takes the place of two or three fittings ordinarily used, namely thimble, shackle or socket, and a clevis. Regular Pattern "Standard" is the shackle equivalent. Regular Pattern Style "A" is the socket equivalent. They provide for the safe strength of rope in general applications. Furnished painted or galvanized, with cottered pin or screw pin, closed or open type. Made in all rope sizes ⅛"-1⅝". Ask for Bulletin No. 72.

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The Buffalo-Springfield 3-Axle Tandem is definitely "bad news" for bumps. For the present, these unique rollers are in service on many fronts, building airport runways and military roads. After the war they will be available for the great peacetime public works program.

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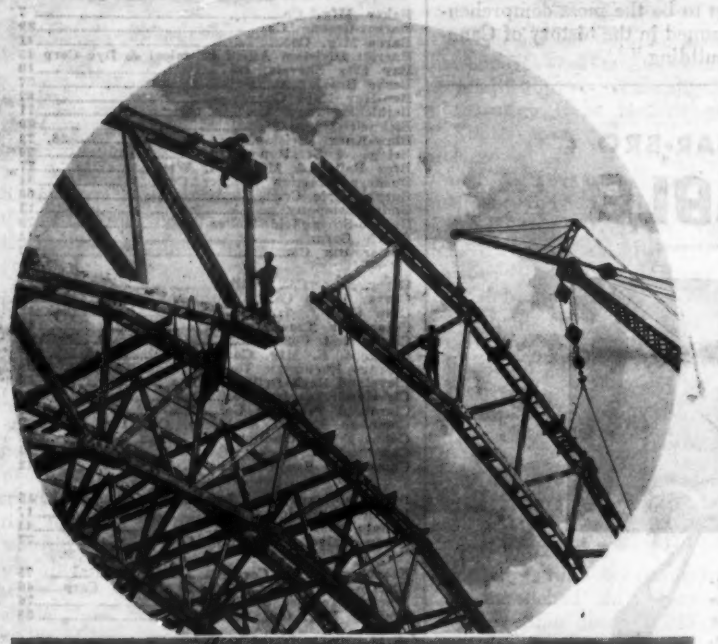
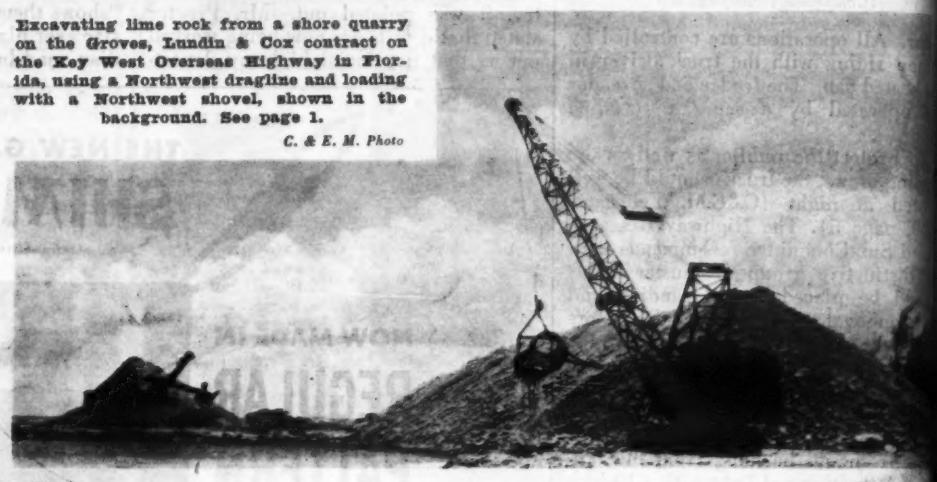


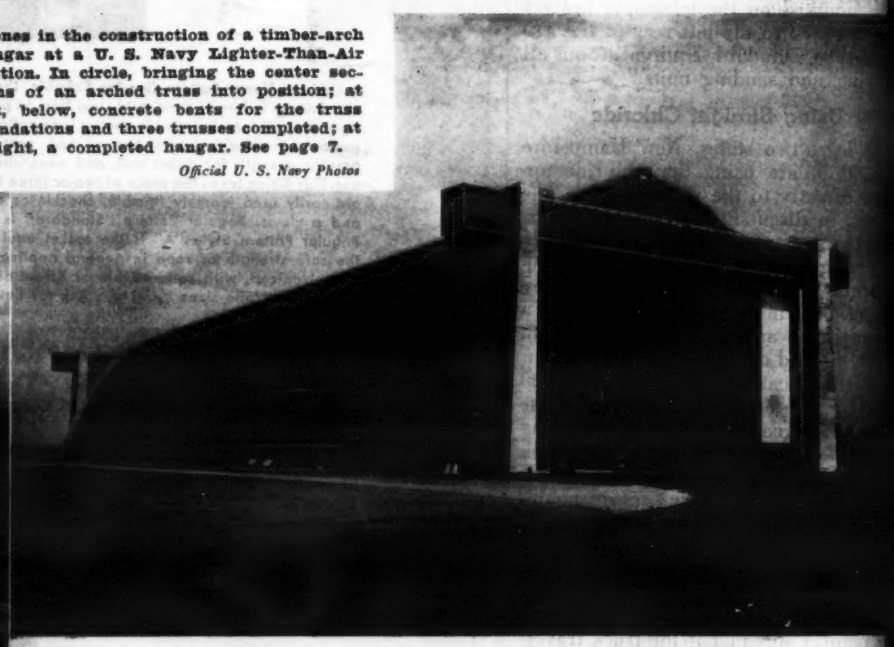


Excavating lime rock from a shore quarry on the Groves, Lundin & Cox contract on the Key West Overseas Highway in Florida, using a Northwest dragline and loading with a Northwest shovel, shown in the background. See page 1.

C. & E. M. Photo

Scenes in the construction of a timber-arch hangar at a U. S. Navy Lighter-Than-Air Station. In circle, bringing the center sections of an arched truss into position; at left, below, concrete beats for the truss foundations and three trusses completed; at right, a completed hangar. See page 7.

Official U. S. Navy Photos



At right, three bents of the falsework for the rigid-frame span of an overpass on an important industrial access road in Ohio. The abutment forms are shown at the left. See page 2.

C. & E. M. Photo

Duquesne Way in Pittsburgh, Pa., is an Allegheny County project to facilitate the movement of traffic through this busy industrial center. Above, at left, a section of this modern boulevard along the Allegheny River, showing the mooring rings for river boats and barges and the demountable traffic barrier which can be removed in time of flood or for access to the wharf area. Center, a model of Duquesne Way as it will appear when completed. Right, this improvement is eliminating scenes like this along the waterfront. See page 23.